CASSAVA TRADE

INFORMATION BRIEF

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Participation in international trade has become one of the most important factors in increasing the prosperity of countries. Yet for many developing countries, perhaps particularly for those in SSA, trade is viewed primarily from a defensive perspective, with a focus on the disruptive effects of imports rather than on the opportunities presented by increased access to world markets. A key reason is the existence of information market gaps that are often associated with trade facilitation and development in developing countries – information on the export performance and potential of many developing countries remains incomplete. TIPS' Trade Information Service series of market briefs, as part of its AusAID-funded Southern African Trade Development Programme, aims to contribute to bridging this information gap for existing producers in the SADC who may not have the financial resources to generate a fully fledged market research process. The briefs are not in-tended to act as the detailed export market intelligence that successful exporting requires, but rather as a basic first-cut analysis of export prospects, to allow enterprises to make the decision on whether to initiate further market research. This Trade Information Brief analyses trade in cassava.

1. Introduction

The aim of the Trade Industry Brief (TIB) is to highlight potential export markets to SADC producers who may not have the financial resources to engage in preliminary market research activities. The TIB is not a detailed market intelligence report but rather highlights potential lucrative business opportunities in a market. A TIB should not be used to determine whether one enters a particular market but rather to ask questions about a market and stimulate further research. A series of TIBs has been produced that covers a range of product clusters. These clusters represent an existing key set of export products with potential for expansion, or a relatively new set, where an indication of a competitive advantage for the region is apparent. This TIB showcases opportunities for SADC producers in the cassava industry.

Cassava is known as a poor man's crop. It is predominately grown by subsistence farmers, as a staple crop, in developing countries that have a temperate climate. This has two important market implications. The amount of cassava traded compared to global production is miniscule; and the largest exporters of cassava are not necessarily the largest producers. Trade patterns illustrate that

import/export activity is concentrated between South East Asia and East Asia. If regional trade is broken down it becomes apparent that China, Thailand and Vietnam are responsible for driving world trade in Cassava.

Cassava is a versatile crop. It has a multitude of applications cutting across various industries and is used in a variety of products: Flour, food, animal feed, paper, textiles, sweeteners, convenience meals, and bio-degradable plastics. To produce these products cassava is processed in numerous ways. The simplest being the preparation of food for human consumption, such as flour, that involves peeling, grinding and drying cassava. While the most complicated process involves the creation of modified starches. To ensure that this TIB is concise, its primary focus is on "fresh, chilled, frozen or dried cassava, whether or not in the form of pellets made either from pieces of the root or from its flour, meal or powder. This product category falls under HS 0714.10 Manioc (cassava).

Cassava products fall into these broad categories, human consumption, animal consumption and industrial applications. These categories have different supply and demand side drivers; as developing a generic agricultural and industrial strategy for generic cassava products is not a useful exercise. This TIB implicitly proposes that growers should target a particular market segment, on a global basis, or a particular region. Based on trade data, the market for starches seems to offer the most promising prospects as it provides the raw material base for an array of processed products. With respect to geographical markets, Africa's demand for cassava pellets to feed its livestock offers potential for intra-African trade.

The international starch market is extremely competitive and is dominated by corn, maize and potato starch products. These crops have benefited from substantial scientific research and thus have a technological advantage compared to cassava. Cassava's future prospects are rooted in improving its supply side, with respect to increasing productivity by adopting improved varieties, which are more resistant to pests and have higher starch content, and improve processing technologies. Developing countries' progress in reforming agricultural processes through distributing better planting material and implementing intensive production methods for small-scale farmers has been inconsistent. To address this failure, by providing growers access to biotechnology and extension services, the content of national research programmes should be revisited, but more importantly, the manner they feed into international and regional agricultural research programmes must be investigated.

This TIB is divided into four broad sections. The first section defines the product and establishes its market. In this section cassava's physical characteristics are discussed which provides the knowledge to develop a series of value chains for cassava's product clusters. The second section is a market study that describes the consumption, production and trade patterns between regions and countries. This information is used to establish a market's size, with respect to its value, shape and growth patterns. This knowledge is used to identify where prospective export opportunities lie for SADC's farmers. The last part of this analysis is to investigate price trends to gauge, at a simplistic level, whether an opportunity is economical. The last section provides exporters with information about gaining market access and placing their product into a market. This section highlights important tariffs and non-tariffs barriers and also proves information about marketing and distribution channels.

2. Rationale behind selecting cassava

Based on the following reasons, which will be explained in greater detail in this TIB, cassava was selected as a potential export crop for SADC's farmers:

- Cassava can be grown in difficult environmental conditions characterised by low or extreme rainfall and infertile, poor, sandy soil (ITC, 2003: 2);
- Cassava is a simple crop to maintain as it has no definite maturation point and thus can be left in the ground from 7 months to 2 years after planting and then harvested as needed, in addition it can recover from pest damage and diseases;
- Cassava provides an opportunity to improve rural dwellers' income by opening up marginal lands under cultivation;
- Cassava provides farmers with the flexibility to opt for more capital intensive, efficient production processes as they develop as "production practices may be completely manual, partially mechanized, or animal-powered, especially for land preparation (Howeler, 2003 :5);
- Cassava is a labour intensive crop to harvest, and as a result it will provide employment unskilled labour in rural areas;
- Cassava is a highly perishable, bulky crop and thus must be processed before it is transported, which opens up numerous opportunities for small-scale farmers to get involved in producing simple, value added products;
- Cassava has a wide range of applications ranging from food products to industrial starches. The processes required to produce these products vary in complexity which gives different parties the flexibility to pursue markets that suit their skill and resource base; and
- Cassava's supply chain has an hour-class shape, which makes it simpler for small scale farmers to be absorbed into the cultivation stage of cassava's value chain.

3. Product definition

Cassava is known by various names (see Table 1). For the purpose of this TIB, the commodity's common name is used and trade data is discussed at the HS 6 digit level under the classification 071410, Manioc (cassava). Other trade classifications are provided in the table, but are not discussed in the TIB, as a reference point to make it easier for interested parties to access leading importers/exporters trade data.

4. Cassava's characteristics

Cassava is a perennial, woody shrub that grows between one to four metres in height. The root can grow up to 15cm in diameter and reach 120cm in length to weigh between one to eight kilograms (ITC, 2003:2). The roots of a 1 to 1.5 year old cassava plant have a starch content that ranges from 20% to 32%, which is good compared to other starch food crops. Cassava is an excellent source of carbohydrates but is an inferior source of protein, fat and vitamins (ITC, 2003: 2).

Cultivating cassava requires one to perform the following activities, in chronological order: select a site, prepare the land, prepare planting materials, plant, apply fertiliser, weed and cultivate, harvest, dry roots, grind roots and store. Processing a commodity to create a final product is the most complex stage in the value chain. This step will be dealt with in detail in the following section as processing activities are tied to product markets. Other stages of the value chain, such as packaging, marketing, distribution and transportation will be discussed in section 14.

Cassava has been selected as a potential cash crop for SADC's farmers as the cultivation stage of its value chain, outlined in the above paragraph, is relatively simple. As a consequence these activities can be performed at the farm gate by a small-scale farmer or at the village or local level. Non-agricultural activities, so-called secondary activities, such as marketing, processing and packaging products are performed by fewer, large scale units. The unique feature of cassava's supply chain is its hour-glass shape because it provides opportunities for numerous small-scale farmers to be involved in cultivating, harvesting and rudimentary process activities compared to other activities along the value chain. The supply chain "begins with small-scale production units, followed by small-scale processing units for the drying and/or milling of cassava" (ARC, 2006). The structure of cassava's value chain provides potential contact points for small scale farmers to participate in a larger market. This suggests that the growth and development of cassava product markets should benefit a large number of resource-poor farmers located on poor lands and local processing units. Reaping the pro-poor benefits associated with cultivating cassava hinges on developing distributed, simple micro technology for farmers to process cassava into a transportable product that feeds into industrialists' downstream processing activities.

Cassava is propagated vegetatively from stem cuttings. This has both a positive and negative implication. The negative implication is that the rate of multiplication of new improved varieties is slow as cuttings do not store well, and they are costly to cut and handle (FAO, 2000). The positive implication is that it is easy to share good genetic material. This is important as cassava's yields are slightly less than other starch crops' yields. This is due to a dearth of research being allocated to cassava as in the past it had an image of being a poor man's crop. However interest in cassava has been growing due to its use as a feedstock, at the same time its use in other industrial applications has also become more widespread. This interest has sparked research in cassava to create better cultivars. Given

TABLE 1: CASSAVA'S NAMING CONVENTIONS

Description	Name
Common Name	Cassava (Africa & Thailand) , Manioc (Brazil), Tapioca (India) ,Yucca (South America)Europe & USA: Cassava (roots) and tapioca (products such as starch, pellets or dried chips)
Botanical Name	Manihot Esculenta
Harmonised Customs Classification	HS 0714.10 Fresh or dried maniocs
EU: Combined Nomenclature of the EU	CN 07.14-1010 Pellets of flour and meal CN 07.14-1091 Human consumption, fresh and whole or without skin and frozen, whether or not sliced and packagedCN 07.14-1099 Other
Chinese Customs	07.14-1010 Fresh manioc 07.14-1020 Dried manioc 07.14-1030 Chilled or frozen manioc

Source: International Trade Centre, 2003: 1-2

that cassava is vegetatively propagated, good genetic material can be copied, and thus a new strain can be quickly introduced into mainstream agricultural systems.

Although cassava can grow in dire circumstances, the best conditions are 150 inches of rainfall, temperature between 25-30C, an altitude below 2000 meters and fertile, sandy-clay soil with a ph range of 5.5-6.5. Cassava cannot survive flooding or freezing conditions. SADC has ideal climatic conditions to grow Cassava, especially Mozambique, Swaziland, Lesotho, Malawi, Tanzania Zimbabwe, Zambia, Madagascar and the Democratic Republic Congo (DRC). Furthermore even countries that are not endowed with good arable land, such as Angola and Namibia, could replace their more "fragile" crops with cassava.

Cassava does not have a mature stage. This allows the crop to be harvested at a farmer's discretion. A plant can be harvested when its roots are sufficiently developed to meet a consumer's requirement, or "it can begin six to eight months after planting (ITC, 2003: 2) or delayed till the next growing season. This feature makes cassava an ideal secondary crop for small-scale farmers in SADC to grow, as farmers can stagger their harvesting activity to ensure that resources are not thinly stretched between crops. In addition this feature allows farmers to influence the market's supply by delaying harvesting if the market is over supplied and to take advantage of price swings.

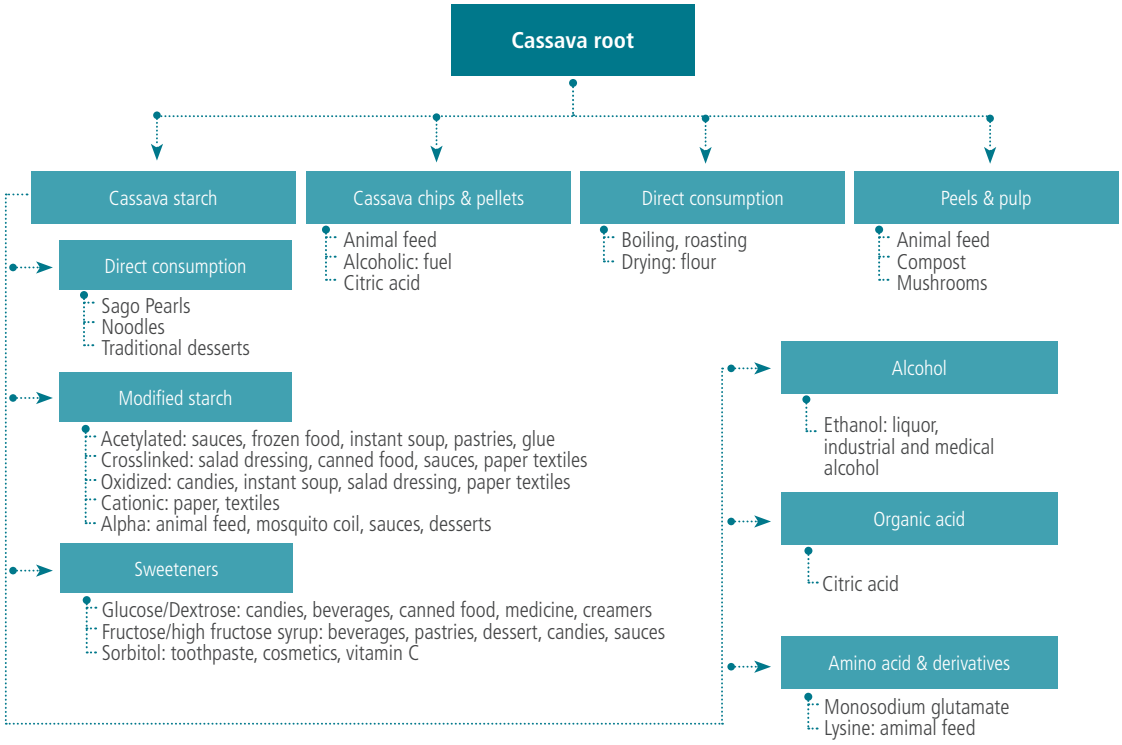
One of the benefits of growing cassava is that farmers can generally decide when they prefer to harvest the crop, however due to cassava's physical attributes post-harvesting activities must follow a strict, short-timeframe. Therefore a farmer's ability to devote resources to post-harvesting activities will affect when cassava should be harvested. The issue is that a farmer's activities are subject to time constraints and the flexibility gained during the pre-harvesting stage should be weighed up against post-harvesting activities.

Raw cassava roots comprise 70% water and are highly perishable. One to three days after harvesting the roots start to deteriorate. If the roots do not receive special treatment, they must be processed within two or three days after they have been harvested (ITC, 2003: 2). Given the perishable nature of the crop's roots and time delay between processing the crop due to inadequate processing machinery at the farm gate, storing it in wooden crates, trenches or moist mulch to increase its shelf life is important.

The high water content of cassava's roots not only shortens its shelf life, but also increases the cost of transporting the product, as it tends to be heavy and bulky. These factors suggest that transporting raw cassava large distances is uneconomical and logistically difficult. SADC's small scale farmers tend to be in rural areas, where access to roads and infrastructure is poor. This will complicate transportation issues. For cassava to be a viable crop cash earning crop, cassava's first stage of processing to create a transportable product must be simple and done at the farm gate. This opens up an opportunity for small-scale farmers to get involved in creating a value-added product, albeit a simple one, and could serve as an initial entry point for them to participate in supplying other processed products. One potential issue that would however inhibit this step, and reduce the ability for farmers to become integrated into the value chain is their limited' access to infrastructure (and other-technology. Finance, etc) that would allow them to process the cassava into a storable product. Nigerian engineers in response to this problem are currently trying to develop processing equipment that can be used by farmers in the rural areas to process cassava into an easily transportable product. SADC's engineers could potentially collaborate with their Nigerian counterparts to develop this technology, which has the additional benefit of not only creating new technology but also fostering regional co-operation.

The cost incurred to produce cassava is location specific and time bound and thus a generic cost schedule cannot be provided. A farmer's costs are dependant on climatic factors that affect a plant's growth pattern, which is tied to the time of planting (Lamchaiyaphum et al 2006:1). Even though farmers' cost structures are not identical, they share a similar profile. The bulk of a farmer's production costs are made up of three main components which are in descending order, labour, then land and finally materials (Lamchaiyaphum et al, 2006). Compared to the other regions that would be SADC's main competitors, predominately Asia and South America, SADC has something of a competitive advantage in unskilled labour and land (although in Asia unskilled labour is abundant, whilst in South America land is abundant). Typically, variable costs comprise 60% of total costs, while fixed costs account for the remainder. A higher ratio of variable to fixed costs makes it easier for SADC's farmers to become cassava growers. First, their initial capital outlay is lower, which reduces their bank loan. The structure of the banking industry makes it difficult for SADC's small scale farmers to rise capital from traditional financial institutions, as a result they are often forced to borrow money from micro-lenders that charge exorbitant interest rates. Second, lower fixed costs reduces a farmer's potential downside and thus reduces his/her risk profile. Third, a smaller fixed cost ratio gives a farmer more flexibility to manage his/her cash flow.

FIGURE 1: PRODUCTS DERIVED FROM CASSAVA'S ROOT



Source: Howeler, 2003:13

5. Demand- and supply-side variables

The cassava shrub contains a root and leaves, which can both be processed to make various products. More products can be made from cassava's root than its leaves. These products require more complex value-added activities and have a greater value. As a result this TIB exclusively discusses products made from cassava's root (see Figure 1). Cassava's products fall into three broad categories: Food for human consumption, animal feed and industrial products. These categories must be discussed individually as the manner in which cassava is processed, distributed and marketed is different for each category.

5.1. Human consumption

Before the root of the bitter cassava variety can be eaten it must be processed to eliminate potentially toxic concentrations of cyanogenetic glucosides. Processing can take the form of soaking the root in water, crushing or heating it. Countries have developed various traditional methods to prepare cassava, which include peeling, boiling, baking, frying and grating it to extract starch. The refined product is then dried over a fire or left in the sun to dry for 2-3 days. It is then added to soups and stews as a thickener, or fermented and cooked. Extracted starch can be used to make breads, crackers or pasta. The leaves of the cassava plant are edible and provide a rich source of protein and vitamins A and B. They are eaten as a green vegetable and prepared in a similar manner to spinach (ITC, 2003:3).

Processing cassava and selling it as a product for human consumption to developed countries' specialised food markets is a potentially lucrative market. Increased awareness of wheat allegories among consumers has created a market for a substitute product. Cassava's dried roots provide another source of carbohydrates for people who have wheat, corn or rice allergies. In addition cassava products could be marketed to consumers who have a taste for exotic foods and health foods that have a lower fat and sugar content. Cassava absorbs less fat when it is fried than other starches, as a result cassava can be used as a healthier alternative to produce snack and convenience foods. Over the past five years Latin America's snack and convenience food industry has created a range of

cassava products and successfully marketed them in the United States (US), European and Japanese market" (ITC, 2003: 15).

Cassava has the potential to become a lucrative speciality food product. However turning that potential into trade flows requires substantial resources. Marketing cassava would be an expensive undertaking as one's marketing strategy would involve educating consumers about an unknown product and then creating an appetite for the product. The market's incumbents have an interest in hindering the spread of cassava products as they have invested in technology that favours potato based products. To introduce cassava products into this type of market would require access to financial resources and a strategy that builds on present demand, explores alternative distribution channels and emphasises the health benefits of consuming cassava products compared to potato or maize based alternatives. It might be argued that pursuing this market is a lengthy and expensive process, and given SADC farmers' limited resources it might not be viable. However this market has the potential to be very profitable and thus this opportunity could be marketed to venture capitalists or boutique food processors. To gain a foothold into this market, a starting point could be to target developed countries that have a large immigrant population and health food stores. In an effort to make the product more attractive to consumers, at the onset of the marketing campaign, the cassava based product would probably be priced below the traditional alternative. In Brazil pre-cooked, deep-frozen cassava fingers are priced 10-15% below the price of deep-frozen potato chips (ITC, 2003:31). However as the product gains popularity and consumers' perceive it to be a superior product because of its health benefits, it could probably be sold at a premium compared top its maize or potatoes based product. In addition fresh cassava's short shelf life and bulky nature complicates logistics and increases transportation costs, and thus introducing processed cassava foods into the market is a better strategy than supplying fresh cassava.

The International Trade Centre of the UNCTAD/WTO publishes market wholesale import prices for cassava destined to be used for human consumption. Although these prices cover Costa Rica's exports of cassava to the European Market they give one a sense of the market's volatility and value. This information can be found at http://www.intracen.org/mns (ITC, 2003:23).

5.2. Animal feed

Cassava animal feed is used to feed cattle, sheep and poultry. Feed is made from processing the plant's roots into either pellets or chips. Cassava's roots are an excellent source of carbohydrates but its protein and vitamin content is poor. As a result cassava feed must be supplemented with soymeal or leaves from the cassava plant (ITC, 2003).

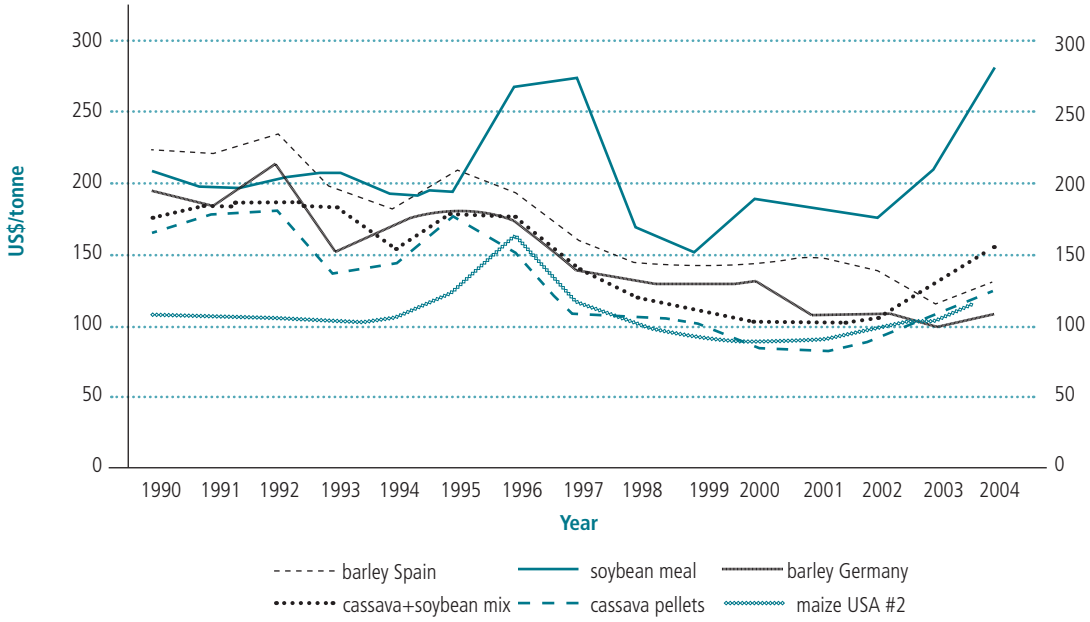
Cassava chips are more widely produced than pellets. They are produced in Thailand, Malaysia and Nigeria. Processing cassava into chips involves slicing them into pieces, not longer than 5cm to ensure they can be stored in silos, and drying them in the sun for 2-3 days or until their moisture content is between 13%-15% (ITC, 2003). During the drying phase, the chips must be regularly turned over. Slicing the roots can either be performed manually or mechanically. The mechanised option is more efficient as it takes one to complete a task that would require three days manual labour (International Starch Institute, 2007). In SADC the need for efficiency must be weighed against surplus unskilled labour and a farmer's ability to access finance.

The diesel/electric powered machine required to slice roots is not complicated or high-tech, it comprises "a rotating notched cutting disk or knife blades mounted on a wooden frame equipped with a chopper" (International Starch Institute, 2007). Roots can be trimmed, peeled and washed, before processing, to create a superior quality product (ITC, 2003). In general, 2kg-2.5kg of fresh roots is required to produce 1kg of chips (ITC, 2003:3), which can be translated into recovery rate of roughly about 20%-40% (International Starch Institute, 2007). The by-product from this process is used to make cassava meal, which is categorised as an inferior product compared to cassava chips, pellets and broken roots because of its lower starch content, higher impurity content and it is more difficult to transport.

Producing cassava chips is a fairly simple process that does not require large capital investment. It provides farmers and small scale businesses with an opportunity to invest in a chipping factory to get a foot hold into the value-added product market. As processing must be done within close proximity of the growing areas due to the perishable and bulky nature of cassava, it ensures the benefits arising from value-added activities are trapped in communities where cassava is grown.

Cassava chips are used as the starting point to produce cassava pellets. When chips are dry, they are transported to a pellet processing factory. To make pellets, chips are mixed with palm oil, grind, steamed, dyed and cooled into a cylindrical shape. The industry standard for these cylinders is roughly 2-3 cm long and about 0.4-0.8 cm in diameter, and their appearance and texture should be uniform (ITC, 2003). Compared to chips, cassava pellets are regarded as a superior value-added product. This is due to the following reasons. First, pellets' product quality is more uni-

FIGURE 2: PRICE TRENDS OF CASSAVA FEED AND OTHER COMPETING PRODUCTS



Source: Howeler, 2003:29

form. Second, pellets are more compact, occupying 25%-30% less space than chips. This reduces transportation, handling chargers for off-loading products and storage costs. Third, pellets are a more stable, sturdy product and reach their destination with considerable less damage than chips. On average, one ton of fresh roots produce 450 kg of chips or 440 kg of hard pellets (Howeler, 2003:15).

Generally the demand for cassava chips and pellets is driven by a population's consumption of livestock products. Generally wealthier consumers include more complex proteins in their diet. Therefore as a country develops, reflected in rising per capita income levels, its population improves the quality of its diet resulting the consumption of livestock products to increase. Second, the demand for cassava is driven by its relative price compared to substitute products. Third, the price of complementary products, in this case protein-rich meals, affects the demand for cassava pellets/ chips. According to the International Trade Centre (ITC) the industry standard for cassava feed comprises 80% cassava pellets and 20% soybean meal. As a result soybean meal prices affect the competitiveness and demand for cassava feed compared to its substitute products, ultimately affecting cassava's price. Indirect factors that affect the demand for cassava are exchange rates, especially the Euro/US$ exchange rate; countries' agricultural polices and climatic conditions.

Prices for animal feed are subject to fluctuations (see Figure 2) as the market is influenced by the interaction of various factors. The market for cassava feed is affected by countervailing forces, or the knock on effect from movements in grain markets, and thus is relatively unstable compared to its substitute grain products. For instance, the EU's grain policy increased soymeal prices, which in turn dampened the demand for cassava feed, however the Euros strength compared to the US$ increased the cost of importing wheat from Eastern Europe, thereby increasing the demand for cassava feed. Given the impact of various countervailing forces, it is difficult to judge whether this market should be targeted by SADC farmers as an export product. Even though the same set of factors holds for various markets, there are slight nuisances. As a result SADC's farmers should not base an export strategy on generalisations. For example in the EU the demand for cassava is influenced by domestic grain prices, especially barley, and manufacturers' ability to source cheap wheat from Eastern Europe. Alternatively in China demand is affected by the price of sweet potatoes..

Based on experts' opinion the market for cassava feed is entering into its consolidation phase, which is characterised by demand growing at a steady rate and demand side driven pressure to reduce supply side costs. Since the 1980s, the demand for cassava feed has remained stable causing trade levels to stabilise. Although Asia and Africa's demand for feed has grown it has barely managed to offset the EU's 1970-1980 demand levels (ITC; 2003). It is predicted that South Korea's demand for cassava feed should decline over the medium term as the growth of its livestock industry decreases due to greater imports of livestock products. In essence Korea is shifting its exports from feed to the finished good. The demand for cassava feed in Viet Nam, Indonesia, China, and Thailand should continue to grow as their populations' per capita income increases, stimulating the demand for livestock products. Apart from China, the other countries can satisfy domestic demand through domestic production. In Latin America, in particular Brazil and Columbia, the demand for cassava feed should increase. An interesting trend is emerging. Although the consumption of cassava feed should increase in Asia and Latin America, it will be met by local production; as a result export opportunities represent a fraction of the total market.

Another factor that SADC's farmers should consider before building capacity to supply this market is its rivals, such as Thailand, Vietnam and Indonesia's pre-existing level of investment. Generally the greater the level of investment, the more likely a country will defend its markets. This is especially the case for Thailand, whose government has a history of providing its farmers support throughout the value chain. Thailand's 200 pellet factories have a combined capacity to produce roughly 10 million tonnes of pellets per year, but the EU's quota is only 5 million tonnes p.a (Lamchaiyaphum et al, 12). Excess capacity could lead to a scenario where factories might operate at 50% of their capacity if they rely solely on the EU's demand for pellets. As a result the Thai government and the its cassva association are motivated to aggressively capture other markets, This anecdote raises the issue whether SADC should compete against Thailand or rather explore other markets. The demand for cassava feed has potential in Sub-Saharan Africa. This market does not "exist" in an established form due to institutional and supply side factors. Perhaps a possible strategy for SADC's farmers to explore is to put effort into creating a market rather than trying to break into established markets, such as China, which are highly competitive.

5.3. Industrial uses

Starches are used in various markets, such as the adhesives, explosive, paper, construction, metals, textiles, cosmetic, pharmaceutical, mining and food industries, and applied to a host of applications within markets. The food industry uses starch to produce monosodium glutamate (MSG), lysine, high fructose, glucose syrup, dextrose monohydrate, dextrose anhydrous and sorbitol. Given the widespread use of starches, this TIB does not provide an exhaustive list of applications for cassava starches. Cassava can be used to produce a native or modified starch. These starches can be used as a finished product or either as a raw material to create a substance that is used in a manufacturing process. An example of a finished product is MSG, and an example of a raw material is organic acids and amino-acids that are used by to produce food, plastics, synthetic resins, rubber products etc.

As a native starch, cassava has high amylose content, and as a result it has a neutral taste, is odourless and has the smoothness and transparency of a gel. Its unique properties are its viscosity and resistance to shear (ARC, 2007). These properties make cassava starch an ideal product for the food processing industry. In addition cassava starch can with stand acidic conditions and is stable in freezing conditions but breaks down when it is heated.

Modified starches are produced by manipulating a native starch's intrinsic physical, chemical or micro-biological processes to meet a user's requirements for his/her specific application. For example cassava starch would need to be modified to produce bio-gradable plastics or any application that requires properties associated with a low amylase content. This process uses advanced technologies that are rapidly evolving. Native and modified starches are not perfect substitute products, even though they are used in cross-over markets. These starches are used to produce sweeteners (maltose, glucose syrup, glucose and fructose), hydrogenated sweeteners (sorbitol, mannitol and maltol) and MSG. In certain markets, where consumers are against genetically modified products, such as baby food, a native starch would be a preferable option (Howeler, 2003). Generally modified starch is used in "heavy" manufacturing applications: Paper industry, textile industry (warp sizing, cloth finishing and printing), construction materials, medicines, etc.

On a global basis the market for starch is growing as economies continue to industrialise and consumerism spreads into peri-urban and rural areas, changing people's cultural preferences and values, altering their lifestyles and what they consume. These demand and supply factors have increased the level of consumption, and also, changed the type of products demanded by end-users. Demand for processed foods, paper products, biodegradable plastics and cosmetics continue to rise. These products are produced using starches. Although the market for starches is growing, the

pertinent question is whether is the market for cassava starch is growing? The answer to this question lies in exploring what type of products is demanded, whether cassava starch has the properties to cater to this market, and does cassava starch face competition from substitute products. As mentioned previously, native cassava starch has ideal properties to be used by the food industry to produce processed foods and sweeteners. However cassava starch would need to be modified to produce plastics or any product that requires a "waxy" compared to a gel-like substance. Substitutes for cassava starch are maize, potato and wheat. These products are entrenched in developed countries markets the US' prefer maize starch and Europeans prefer potato and wheat starches. These starches dominant market position is due to historical usage patterns, the continued development of products that require these starches' properties and the fact that the producers of these starches reside in developed countries and thus have the resources to conduct scientific research to create new application for these starches. For cassava starch to gain a sizable market position, research is required into its properties and the development of modified starches "with specific properties that make them preferable for certain industries" (ITC, 2003:32). As mentioned previously to compete in this market requires substantial scientific resources, which SADC does not have access too.

The market's growth potential is impressive because the demand for starch based applications in the food industry and industrial sector is increasing, and industry is searching for a cheaper substitute, as a result market timing to introduce a new starch alternative is excellent. However this has no consequence if SADC's farmers do not have the ability to tap into this market due to their technological constraints. In totality the starch value chain is technologically advanced, however within the chain exists relatively simple components. Over the short to medium term there exists an opportunity for SADC's small scale farmers to produce wet starch that could be sold to factories to produce, higher quality dry starch. Although this option provides an entry point for small scale farmers to enter into the cassava starch value-chain, it reduces the overall quality of the final produced product. Factories' quality of starch and the efficiency of its conversion process are optimal when roots are used.

An emerging market for cassava starch is to produce biodegradable products, such as packaging material and kitchenware. Discarded plastic products have the potential to cause environmental pollution, and as a result discarding these products places a burden on municipalities' waste management system (ITC, 2003). Studies show that consumers and industry participants are interested in buying and supplying bio-degradable plastic products. This market's annual growth is estimated to be 30% in Europe and the US, products provided these product's physical properties meet industry standards and they can be placed o the compost heap (ITC, 2003:32). This could represent an FDI opportunity for SADC which has the land, labour and climatic conditions to grow cassava, but requires a technology partner and capital to build factories.

6. Countries' production patterns

According to the Food Agricultural Organisation (2002) cassava is grown in 101 countries. These countries are not evenly dispersed among regions, "in 2003 about 54% of cassava in the world was produced in Africa, 29% in Asia, and only 14% in Latin America and the Caribbean" (Howeler, 2003: 2). Furthermore the demand drivers stimulating production among regions are different. In Asia, Latin America and the Caribbean, cassava is primarily produced for the domestic feed, while in Africa cassava is produced for human consumption. Although Thailand and China produce cassava to make animal feed, it is not their primary market. China produces cassava for industrial applications, in particular raw material for starch production (MSG, sweeteners), and Thailand produces cassava as mainly an export crop.

From 2000-2004 the global production of cassava grew at a modest rate of 5% p.a calculated on an average annual basis (see Table 2). The top 10 global producers of cassava grew their production by 3% from 2000-2005, while other producers achieved 5% growth. This indicates that emerging producers have the potential to move into the top 10. These emerging producers include Vietnam, Paraguay, Malawi, Madagascar, Peru, Zambia, Rwanda, Senegal, Cambodia and Costa Rica.

The world's production of cassava is geographically concentrated in Africa and Asia. This is confirmed by the fact that nine out of the world's top 10 producers are located in the above regions, and that the world's top 10 producers comprise 76% of the world's production. Although the world's production of cassava chiefly resides in 10 counties, these countries' share of global production is relatively small, excluding Nigeria. From 1990 to 2004 countries' positions within the top 10 changed. In 2004 Nigeria become the world's largest producer of cassava, relegating Brazil to second position. Eight of the top 10 producers' share of global production declined in 2004 compared to their 1990 level. The biggest losers were Brazil, Thailand and the Democratic Republic of Congo (DRC). Nigeria and Ghana managed to increase their share of global production during 2004 compared to 1990.

A notable feature is the presence of six African countries among the top 10 producers. Furthermore, five of these countries' average annual growth rate was positive and greater than their counterparts on the list, excluding Indonesia. Africa has the distinction of having the largest producer, Nigeria, and the fastest growing producer, Angola. Africa's position as the world's dominant producer of cassava can be attributed to government policies to improve food security, introducing new higher yielding, disease resistant cultivars and favourable climatic conditions (ITC, 2003). Cassava has the potential to be an attractive export crop as it builds on Africa's existing strong productive capacity.

In 2004 the world's largest producers of cassava were Nigeria, Brazil and Thailand, whose share of global production was 19%, 12% and 11%, respectively. Over the 2000-2004 period, both Brazil and Thailand's average annual growth rate was significantly lower than Nigeria's. Cassava production in Nigeria grew, on an average annual basis, by 4.50% p.a to become the third fastest growing top 10 producer. Nigeria's growth is impressive as it is off a larger base than other top 10 producing countries. Nigeria's success is due to the government's initiative to improve the interaction between the industry's supply and demand side capabilities. The remarkable feature about the Nigerian government's approach was the manner in which policies were sequenced and the ability to draw on international resources by forming partnerships with international agencies. Initially the government's policies focused on improving farmers' yields and product quality. The second stage was to create a stable source of demand for a relatively simple, value-added product that could be processed at the farm gate. The government legislated that bread must contain a certain percentage of cassava flour. Once the government had stimulated demand for cassava, its next initiative was to build the industry's supply-side to produce sophisticated value-added products. SADC's farmers could learn from Nigeria's experience to build a regional industry as SADC's farmers face similar constraints. Furthermore encouraging

TABLE 2: MAJOR PRODUCERS OF CASSAVA ('000TONS)

	Year			Average annual growth		Percentage of total	
	1990	1995	2004	1990-2004	2000-2004	1990	2004
Nigeria	19 043	31 404	38 179	4.09	4.50	12.54	18.82
Brazil	24 322	25 423	23 927	-0.12	0.63	16.02	11.79
Thailand	20 701	16 217	21 440	0.25	2.98	13.63	10.57
Indonesia	15 830	15 441	19 425	1.47	4.82	1042	9.57
DRC	18 715	16 870	14 951	-1.59	-1.62	12.32	7.37
Ghana	2 717	6 611	9 739	9.55	4.69	1.79	4.80
Tanzania	7 792	5 969	6 890	-0.87	-0.82	5.13	3.40
India	4 962	5 85	6 700	2.17	2.74	3.27	3.30
Angola	1 600	2 550	6 650	10.71	10.67	1.05	3.28
Mozambique	4 590	4 178	6 413	2.42	4.58	3.02	3.16
Vietnam	2 276	2 212	5 573	6,61	29,42	1.50	3.28
Paraguay	3 550	3 054	5 500	3.18	19.25	2.34	2.71
Uganda	3 420	2 224	5 500	3.45	2.59	2.25	2.71
China	3 216	3 517	4 216	1.95	2.48	2.12	2.08
Benin	937	1238	2 955	8.55	5.89	0.62	1.46
Malawi	145	328	2 559	22.77	-1.84	0.10	1.26
Madagascar	2 292	2 400	2 191	-0.32	-2.88	1.51	1.08
Colombia	1 939	1 801	1 934	0.02	2.04	1.28	0.96
Philippines	1 854	1 906	1 641	-0.87	-1.82	1.22	0.81
Coted'Ivoire	1 393	1 608	1 500	0.53	-2.95	0.92	0.74
Top 20 producers	141 293	150 809	187 891	2.06	3.49	93.04	92.61
Other producers	10 571	10 993	14 988	2.53	1.65	6.96	7.39
Total production	151 865	161 802	202 879	2.09	3.35	100.00	100.00

Source: Food and Agriculture Organisation Statistics (FAOSTAT)

intra-regional knowledge could be the first step toward establishing an African cassava hub that gives Nigeria and SADC access to supply-side resources and a demand base to build a lucrative industry.

The interaction between cultivar type, planting season and soil type determine yields. If high yielding cultivar varieties are planted combined with good management practices, cassava yields can reach 20-25 tonnes per hectare (IFAD, 2000:9). Productivity levels, based on yields per hectare, are higher in Asia, Latin America and the Caribbean compared to Africa. However Africa's yields have reported the fastest growth, albeit off a low base, while Latin America and the Caribbean's yields have stagnated (IFAD, 2000:9).

Over the past decade the area allocated to cassava production in Asia has decreased but yields have markedly increased and as a result production has steadily increased. Improved productivity levels stems from the respective governments' "effort to distribute widely the new high-yielding and high-starch varieties, as well as the adoption of improved cultural practices, such as more balanced fertiliser use and soil conservation measures" (Howeler et al, 2004). Thailand and Vietnam have aggressively reformed their cassava sector. In Thailand new cassava varieties are planted in roughly 100% of its farmlands and 70-80% of farmers apply chemical fertilisers (Howeler et al, 2004). In Vietnam new cassava varieties are planted in about 50% of its cassava growing area and about 80% of farmers apply chemical and/or organic manures (Howeler et al, 2004).

This has two implications for SADC farmers' ability to reduce Asia's dominance of the cassava market. Thailand has access to a growing domestic and international market for its cassava products. However Thailand's ability to service this demand could be potentially strained in the medium term, as it does not have any more land available for cassava cultivation and it has exploited productivity gains associated with planting new cultivars and crop management. Implicitly Thailand is reaching its productive ceiling, yet demand in the region and domestically is increasing. Africa has access to the factors of production and has already established its presence as a large producer, which can be built upon to create the momentum to improve its productivity, required to capture potential surplus demand in the Asian market.

In 2004 SADC's production comprised 20% of global supply (refer to Table 3), which is slightly larger than the world's largest producer, Nigeria. This comparison illustrates that SADC's productive capacity is significant. From 2000-2004 SADC's production grew by 1.08%, which is lower than the global average of 3.35%. This is a troubling trend as it indicates that SADC's relative position is dropping. It needs to be borne in mind that these statistics might be conservative as a large percentage of cassava grain in SADC is not traded and consumed as a subsistence crop.

The decline in SADC's production could be easily reversed as the region has the climatic conditions, access to land and abundant labour to improve its performance. SADC has access to the factors of production to produce cassava but not trade it. Simple processing technology that can be used at the farm gate or in the village to create an easily transportable product does not exist. A general lack of infrastructure exacerbates the problem of transporting a product which by its very nature is difficult to distribute unless it is processed. As a result trade in cassava is constrained chiefly by two bottlenecks, access to simple, cheap micro technology as farmers access to capital is limited and general infrastructure. On the demand side SADC's farmers and its industries are not taking advantage of cassava's various applications, as it is rigidity regarded as a staple crop. This illustrates that there is an underlying marketing problem and also that industries' supply chains act in isolation. For example, although cassava is an agricultural product its value chain could interact with livestock producers' value chain or South Africa's energy value chain, as cassava can be processed in animal feed or bio-fuels.

SADC has the potential to increase its production, and more importantly, use cassava as a crop to bring marginal subsistence farmers into the cash economy, and based on Nigeria's example (refer to the appendix) it is an achievable task. The region also has the opportunity to learn from Nigeria's experience with respect to moving the production of cassava away from subsistence farming to inclusive commercial farming. This is a valuable source of intangible capital that SADC's farmers can tap into, and if used properly, should reduce the potential hurdles that SADC's farmers could face when they establish a cassava supply chain.

7. Countries' consumption patterns

Data suggests that a region's economic development influences the type of value-added cassava products it demands and consumes. Generally least developed regions consume cassava as a staple food, while developed regions use cassava as a raw material to produce starches. In Africa cassava is predominately consumed as a staple crop for human consumption. Africa's consumption level is tied in theory to its production capacity. A miniscule share of Africa's total consumption is used as animal feed. This should change over the medium term as government and

TABLE 3: SADC'S PRODUCTION OF CASSAVA ('000TONS)

	Year			Average Annual Growth		Percentage of Total	
	1990	1995	2004	1990-2004	2000-2004	1990	2004
Democratic Republic of Congo	18,715	16,870	14,951	-1.59%	-1.62%	12.32%	7.37%
Tanzania	7,792	5,969	6,890	-0.87%	-0.82%	5.13%	3.40%
Angola	1,600	2,550	6,650	10.71%	10.67%	1.05%	3.28%
Mozambique	4,590	4,178	6,413	2.42%	4.58%	3.02%	3.16%
Malawi	145	328	2,559	22.77%	-1.84%	0.10%	1.26%
Madagascar	2,292	2,400	2,191	-0.32%	-2.88%	1.51%	1.08%
Zambia	640	744	957	2.92%	4.09%	0.42%	0.47%
Zimbabwe	95	150	190	5.08%	2.08%	0.06%	0.09%
Seychelles	0	0	0	0.00%	0.00%	0.00%	0.00%
Mauritius	0	0	0	-2.67%	-3.51%	0.00%	0.00%
Total SADC Production	17,154	16,320	25,851	0.92%	1.08%		
Other Producers	134,710	145,483	177,028	2.42%	3.96%	88.70%	87.26%
Total Production	151,865	161,802	202,879	2.09%	3.35%		

Source: FAOSTAT

international agencies' initiatives to build a livestock feed industry gains momentum. In Latin America and the Caribbean approximately 60% of cassava is consumed by the traditional food sector, while the remainder is processed into animal feed and used by industry to produce starch (ITC, 2003: 15). In Asia cassava is predominately used as animal feed, in the form of pellets, or industrial applications to produce starches. An exception to this generalisation is Indonesia, India and Vietnam; where cassava is utilised in human consumption. This region is also experimenting with producing ethanol from cassava. In the European Union (EU) cassava is mostly consumed by the livestock industry as an animal feed for its pork industry. The EU's consumption of cassava feed is falling and the slack is being absorbed by the demand for industrial starches.

The top 10 consumers of cassava are located in Asia and Africa; as a result it is fair to say that the consumption of cassava has a geographical dimension. Based on data, this trend should not change as the emerging consumers of cassava are Thailand, China, Guinea, Rwanda, Peru, Kenya and Vietnam.

The ten largest consumers of cassava, with respect to volume and not value, comprised 73% of global consumption in 2004. In totality the top 10 consumers' market share remained relatively stable from 1990-2004, as it moved within a 1% range. Countries relative ranking within the top 10 from 1990-2004 also remained relatively unchanged, barring Indonesia and Nigeria. With respect to market share over the period, countries' fortunes have changed: the biggest loser was the DRC and Indonesia and Nigeria were the biggest gainers.

From 2000-2004 growth in global consumption was negligible, reaching only 0.15% (refer to Table 4). The top 10 consumers' demand for cassava declined by 0.35% from 1990-2004. Nine of the top 10 countries use cassava as a staple food, and thus it is not surprising that the market's growth in demand is insignificant. The market's historical low growth rate should not deter investors' interest as cassava has a dual market. The tradable market is dominated by the Asian exporters that supply cassava pellets and chips to the world, and the staple food market, mostly in Africa countries. The consumption data reflected in Table Four gives a conservative picture of cassava's trade prospects as it is skewed toward poorer countries that use cassava as a staple food. Growth prospects for cassava are prevalent in middle-income developing countries that require an alternative source of fuel and raw material feedstock to support the industrialisation of their economies. Therefore growth prospects for cassava exist for its use as an industrial feedstock to produce starch and bio-fuels. Even though these markets are in their developmental stage, on a volume basis, they have outpaced the consumption of cassava as food and feed (refer to Figure 3).

An interesting observation is that the largest producers of cassava tend to be the largest consumers. Nine countries are among the ten largest consumers and producers of cassava. The only two countries to buck this

TABLE 4: MAJOR CONSUMERS OF CASSAVA ('000TONS)

	Year			Average Annual Growth		Percentage of Total	
	1990	1995	2004	1990-2004	2000-2004	1990	2004
Democratic Republic of Congo	15,464	5,463	14,122	-0.65%	-1.77%	19.18%	14.23%
Indonesia	8,155	5,730	12,425	3.05%	1.25%	10.11%	12.52%
Nigeria	8,236	3,327	12,338	2.93%	-2.80%	10.22%	12.43%
Brazil	8,058	3,757	6,771	-1.24%	-3.77%	9.99%	6.82%
India	4,649	2,431	5,722	1.50%	0.02%	5.77%	5.77%
Tanzania	5,886	1,463	5,122	-0.99%	-2.60%	7.30%	5.16%
Mozambique	3,598	1,803	4,758	2.02%	5.21%	4.46%	4.80%
Ghana	1,949	551	4,528	6.21%	1.87%	2.42%	4.56%
Angola	1,520	1,630	3,559	6.27%	5.06%	1.89%	3.59%
Uganda	2,251	1,766	3,098	2.31%	7.24%	2.79%	3.12%
Madagascar	1,726	1,313	2,005	1.07%	-2.21%	2.14%	2.02%
Thailand	513	1,448	1,989	10.16%	35.72%	0.64%	2.00%
China	1,263	541	1,941	3.12%	3.97%	1.57%	1.96%
Philippines	1,650	860	1,551	-0.44%	-2.22%	2.05%	1.56%
Colombia	1,245	300	1,546	1.56%	1.79%	1.54%	1.56%
Côte d'Ivoire	1,254	244	1,330	0.42%	-3.37%	1.56%	1.34%
Guinea	334	707	1,202	9.58%	9.67%	0.41%	1.21%
Benin	675	1,337	1,135	3.78%	3.41%	0.84%	1.14%
Malawi	132	738	1,095	16.34%	-3.76%	0.16%	1.10%
Rwanda	258	385	1,002	10.19%	5.90%	0.32%	1.01%
Top 20 Consumers	68,816	35,792	87,238	1.71%	0.22%	85.35%	87.93%
Other Consumers	11812	54914	11980	0.10%	-0.37%	14.65%	12.07%
Total Consumption	80,628	90,706	99,218	1.49%	0.15%	100.00%	100.00%

Source: FAOSTAT

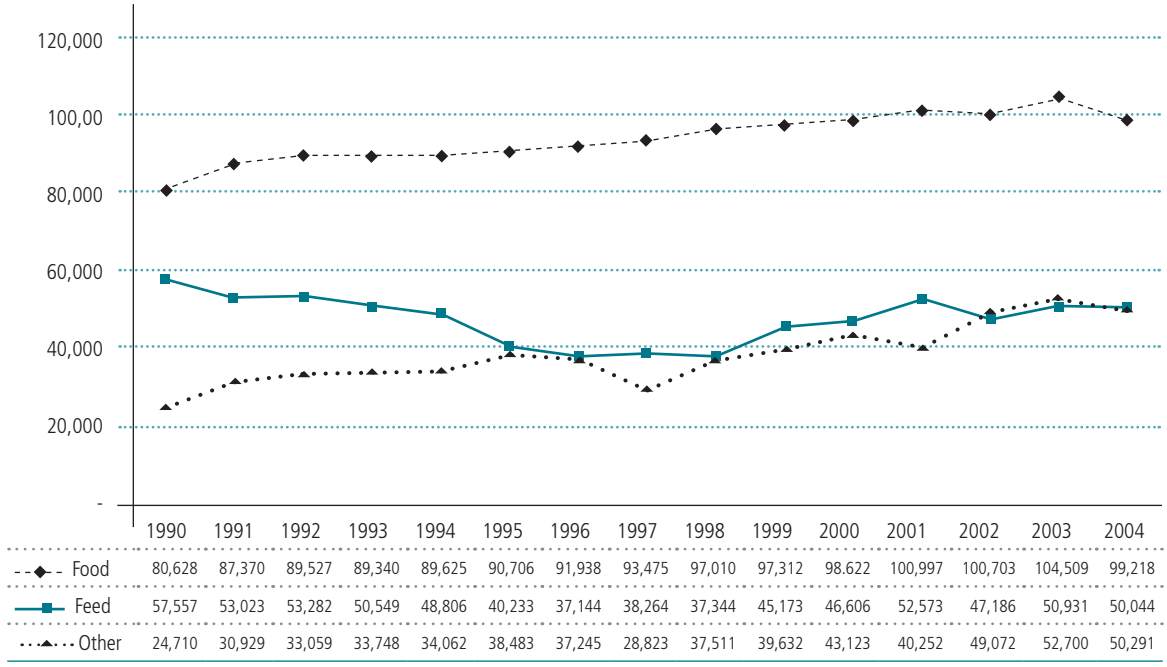
trend are Thailand and Uganda that only appear on the producers and consumers list, respectively. Also most countries produce more cassava than they consume. The important factor to establish is whether countries' production surplus is exported, which would create competition for SADC farmers' product. To answer this question, trade flows are analysed in the next section.

In 2004 SADC's share of global consumption was 32%, a fall of 4% from its 1990 level of 36% (refer to Table 5). From 2000-2004 SADC's consumption of cassava declined by 0.26%, managing to fall below the world's annual average growth rate of 0.15%. SADC's consumption profile with respect to its absolute value and composition has remained relatively static over the period. This reflects cassava's status as a substance crop that is gown on marginal land. SADC's poor performance should not be viewed as negative but as an opportunity as it reflects a dearth of investment and interest in an industry where SADC's competitive advantage with respect to land and labour has not been harnessed.

8. Regional trade

Trade in cassava comprises mostly pellets and chips for animal feed, while the remainder is for starch and flour for industrial use. Trade in fresh cassava is generally limited to exchanges between bordering countries due to the product's bulkiness and perishable nature. Although cold chain management can improve a product's shelf-life, it complicates logistics which increases transportation costs that cannot be passed onto the final consumer, unless the product is destined for a specialised market

FIGURE 3: CONSUMPTION OF CASSAVA ON A PRODUCT BASIS ('000 TONS)



Source: FAOSTAT

TABLE 5: SADC'S CONSUMPTION OF CASSAVA ('000TONS)

	Year			Average Annual Growth		Percentage of Total	
	1990	1995	2004	1990-2004	2000-2004	1990	20.04
DRC	15,464	5,463	14,122	-0.65%	-1.77%	19.18%	14.23%
Tanzania	5,886	5,730	5,122	-0.99%	-2.60%	7.30%	5.16%
Mozambique	3,598	3,327	4,758	2.02%	5.21%	4.46%	4.80%
Angola	1,520	2,431	3,559	6.27%	5.06%	1.89%	3.59%
Madagascar	1,726	1,803	2,005	1.07%	-2.21%	2.14%	2.02%
Malawi	132	300	1,095	16.34%	-3.76%	0.16%	1.10%
Zambia	608	707	902	2.85%	3.87%	0.75%	0.91%
Zimbabwe	90	142	180	5.07%	2.05%	0.11%	0.18%
South Africa	-	3	0		98.95%	0.00%	0.00%
Seychelles	0	0	0	2.48%	5.53%	0.00%	0.00%
Mauritius	0	0	0	2.79%	4.46%	0.00%	0.00%
SADC Consumption	29,025	29,826	31,744	0.64%	-0.26%	36.00%	31.99%
Other Consumers	51,604	60,880	67,474	1.93%	0.35%	64.00%	68.01%
Total Consumption	80,628	90,706	99,218	1.49%	0.15%	100.00%	100.00%

Source: FAOSTAT

From 1995-2005 trade in cassava was erratic. This is not surprising as trade in cassava is dominated by animal feed, whose prospects are affected by the grain market's behaviour. The grain market tends to be volatile as it is subject to government interventions. In addition cassava's trade spikes are due to the fact that it is a thinly traded market, whose behaviour is driven by five countries' demand patterns and three countries' supply capacity. For example, the major surge in 2003 is due to China's increasing demand, while the decline in 2001 is due to the EU's falling demand.

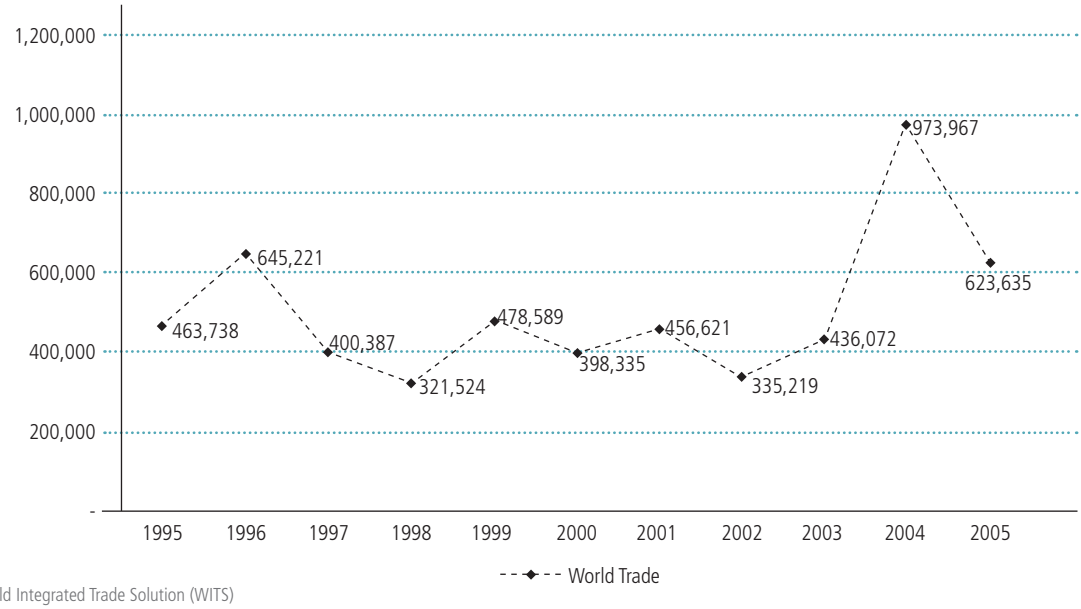
Regional trade in cassava has geographic and product specific dimensions. From Table 7 it becomes apparent that in 1995 the predominant regional exporter was South East Asia with an 86% share of global exports and the largest importer was East Asia with a 74% share of global imports. Another feature that is immediately apparent from glancing at the matrix is that trade occurs between trading blocks: East Asia and South East Asia are trade partners, NAFTA and Central America are trade partners, and the EU's trade partners are South East Asia and Central America. Trade between the identified regional blocks has specific product dimensions, which is discussed in this section.

8.1. Regional exports

In 2005 South East Asia was the world's dominant exporter of cassava; comprising 86% of the market (refer to Table 7). Although South East Asia's share of global exports has decreased since 1995, it is a marginal decline of 3%. The drop in market share does not imply that the region's productive capacity is diminishing as it managed to grow its exports by 3% from 2000-2005. This level of growth is below the global average and is the second lowest growth rate achieved by the top 5 exporting countries. Nevertheless South East Asia's export growth is significant because it is off a large base.

The region's export growth was driven by Thailand, Vietnam and Indonesia. In 2005 intra-regional trade was negligible accounting for less than 1% of the region's exports. The region's export market is geographically concentrated and country specific. The majority of South East Asia's exports are destined for East Asia, in particular China and Korea. The region's top three export markets comprise 90% of its trade. China is essentially South East Asia's export market, as it accounted for 79% of the region's exports in 2005. In second and third place, respectively, were Korea and Spain that comprised 6% and 5% of South East Asia's exports. These trade patterns are not accidental. The Thai government has pursued a focused export strategy that spans the entire value chain, from selecting cultivars that have the best properties to produce a specific product to mapping that product to a market. This case study illustrates that developing an export strategy is more complicated than selecting a country / region to export one's product too; rather it involves taking activities throughout the value chain into consideration. SADC's farmers can learn from Thailand's

FIGURE 4: TRADE IN CASSAVA 1995-2005 (US$'000)



Source: World Integrated Trade Solution (WITS)

TABLE 6: REGIONAL TRADE MATRIX FOR 2005 (US$'000)

		Exporting Countries								World Imports	Percentage
		South East Asia	Central America	EU25	South America	NAFTA	South Asia	SADC	Middle East		
Importing Countries	East Asia	459,244	-	-	816	-	-	-	-	460,070	73.8
	EU25	36,513	11,549	7,357	1,550	61	1	1	-	59,534	9.5
	NAFTA	645	43,228	2	3,480	13	1	-	-	48,725	7.8
	Central America	-	910	-	-	2	-	-	-	913	0.1
	South America	1	-	-	614	0	-	-	-	615	0.1
	South East Asia	324	-	-	0	14	4	-	-	445	0.1
	Middle East	1	-	3	-	0	0	0	8	14	0.0
	South Asia	0	-	0	-	-	9	-	0	9	0.0
	SADC	-	-	-	-	-	-	-	-	3	0.0
	World Exports	533,926	66,173	7,853	7,790	201	18	11	8	623,635	100.0
	Percentage	85.62	10.61	1.26	1.25	0.03	0.00	0.00	0.00		

Source: World Integrated Trade Solution (Wits)

experience as the country is also a developing country that faces similar constraints with respect to small scale farmers' access to resources. This TIB does not advocate that SADC's farmers should copy their Thai counterparts but could use their experience to stimulate ideas about integrating activities throughout a value chain to create an export strategy and most importantly methods to include small scale farmers into this value chain. Information about Thailand's experience can be found at www.fao.org, under Global Cassava Strategy.

Central America was the world's second largest exporter of cassava in 2005, managing to secure a 12% share of global exports, which is impressive considering that in 1995 it had a 4% market share. Although the region's exports experienced strong growth over the decade its growth spurt occurred from 2000-2005, when the region's exports experienced phenomenal growth of 19%. The region's export growth is driven by Costa Rica and Nicaragua. Intra-regional trade from 2000-2005 was minuscule, fluctuating between a low of 0.65% and a high of 1.65%. In 2005 the region's import partners were the US and the EU, in particular the Netherlands and France. The US is the region's single largest importer; it imports 64% of Central America's exports. This region's export success demonstrates that exporting a specialised product, in this case fresh cassava, can be a profitable strategy. However if this strategy is pursued, aspects of geography and importing into "cold-chain" hubs are important. It is not a coincidence that Costa Rica's largest EU trading partner is the Netherlands as it has the infrastructure to distribute a perishable production, relatively quickly, throughout Europe.

In 2005 the EU was the third largest exporter of cassava. Over the past decade the EU's market share has declined from 7% in 1995 to 1% in 2005. Growth rates indicate that the EU shed more of its market share during the second part of the decade from 2000-2005 as the EU's exports contracted by 23%. From 2000-2005 intra-regional trade ranged from 94% to 99% of the region's trade activity. In 2005 the region's top six export destinations were Spain, the Netherlands, Belgium, Italy, Portugal and France, which comprised 90% of the region's total exports. Trade activity is predominately concentrated within EU15 states. The EU predominately imports cassava in a pellet form and it is used as animal feed. Since 2000 this market has followed a downward trend due to the BSE scare, falling domestic grain prices, strengthening of the Euro against the dollar and a change in the EU's agricultural polices that made the relative price of grain feed attractive. Spain's imports of cassava reflect its growing demand for industrial starch to support its food processing industry.

An interesting observation is that Africa produces the majority of the world's cassava, but it is not classified as a major exporting region. This is due to the fact that cassava is grown as a subsistence crop for farmers' own usage as a staple food. In addition cassava's physical attributes, especially the requirement to process the crop within days of post activity,

TABLE 7: REGIONAL EXPORTS OF CASSAVA (US$'000)

	Year			Average Annual Growth		Percentage of Total	
	1995	2000	2005	1995-2005	2000-2005	1995	2005
South East Asia	411,394	336,252	533,926	2.64%	9.69%	88.71%	85.62%
Cental America	18,367	27,494	66,173	13.67%	19.20%	3.96%	10.61%
EU25	32,517	28,988	7,853	-13.24%	-22.99%	7.01%	1.26%
South America	545	2,623	7,790	30.47%	24.32%	0.12%	1.25%
NAFTA	82	434	201	9.41%	-14.25%	0.02%	0.03%
South Asia	3,212	126	18	-40.62%	-32.62%	0.69%	0.00%
SADC	1,874	139	11	-40.43%	-40.26%	0.40%	0.00%
Middle East	285	-	8	-29.65%		0.06%	0.00%
WORLD	463,738	398,335	623,635	3.01%	9.38%	100.00%	100.00%

Source: Wits

exacerbates Africa's supply-chain bottlenecks. These supply side features include the availability of micro processing technology at the farm gate, farmers' access to capital to purchase inputs and good quality transport. On the demand side, market's for cassava products have not been developed as commercial interest in the product has been lacklustre due to its image as a poor man's crop. Supply side bottlenecks coupled with limited markets for the cassava based products created unfavourable conditions for the tradability of cassava products. Nigeria is an interesting case study (refer to the appendix) as one of the steps the government took to create a market was reducing "easy" supply side bottlenecks and then creating a mass market for a simple processed product and then reinvestigating the industry's supply side to address advanced issues.

8.2. Regional imports

From 1995 to 2005 the top three importers' share of global imports and their relative ranking considerably changed (refer to Table 8). Furthermore over this period, the top three regional importers increased their value of imports, and also, the range of products that they imported. Over the past decade East Asia's imports of cassava grew, however the majority of this growth occurred after 2000. From 1995-2005 East Asia's imports grew by 17% but between 2000-2005 imports increased by 54%. This growth spurt can be attributed to the interaction between the following factors: China's rapid industrialisation, Thailand's search for another export market after the collapse of its key export market (EU), and the impact of free trade agreements, such as the ASEAN Free Trade Area and Thailand's Early Harvest Agreement with China.

East Asia's growth spurt increased its market share from 21% in 1995 to 74% in 2005, toppling the EU from its 1995 dominant market position of 88% in 1995 to 10% in 2005. Therefore East Asia's growth spurt changed the balance of power in the import market. East Asia's demand for cassava is driven by China's demand for livestock feed and starches. A relatively large importer in the region is Taiwan, but it is small compared to China. Intra-regional trade is not significant. In 2005 86% of East Asia's imports were from South East Asia, in particular Thailand, Vietnam and Indonesia.

In 2005 the second largest import market for cassava was the EU with a 10% share of global exports. From 1995-2005 this market's share of imports has continued to decline, however the rate of its decline was more pronounced during 2000-2005. Demand for cassava pellets to feed its livestock industry has steadily decreased due to the EU's agricultural policies, such as subsiding farmers' cereal production, which made substitute grain products more attractive and exchange rate movements. The EU's import basket of cassava products can be divided into three submarkets. The animal pellet market is dominated by Thailand. The market for pellets of flour and meal is imported from Coast Rica into the Netherlands (ITC, 2003). The Netherlands re-exports these products throughout Europe (ITC; 2003). Lastly, a growing market for food products made for human consumption which is dominated by Costa Rica (ITC, 2003). In the respective markets it would be very difficult for a country to challenge the market leaders' position (ITC, 2003). As a result entering into direct competition with the respective market leaders by selling a similar product at similar price could start a price war. SADC's farmers/ producers would probably not win this war as the do not have access to established networks. Therefore SADC farmers/ producers' ability to enter this mar-

ket would be based on creating innovative, processed food products and marketing them to distribution channels that serve specialised retailers, such as health stores, ethnic cuisine caterers, and food outlets catering to immigrant populations.

In 2005 the third largest import market was NAFTA with an 8% market share, which is considerably better than its 3% market share in 1995. The region's primary importer is the US comprising 97% of the region's imports. According to the FAO (2004), the majority of cassava imported into the US is used for its livestock industry. The next largest user of imported cassava is for industrial applications in the form of starches and the reminder is consumed food. Although cassava used for human consumption is the smallest market, it is the fastest growing sub- sector. This market's growth rate in value of 15% was largely driven by the US' demand for cassava for human consumption to produce starches and ethnic cuisine for its immigrant population. The region's preferential supplier is Costa Rica, which comprised 88% of its imports in 2005.

9. Country trade

9.1. Countries' imports

Global imports have grown at a steady rate of 9% per annum from 2000-2005. However this figure hides the fluctuation and variation in growth between import markets. This is an important point for potential exporters to realise, as an exporter's ability to choose a "growing" import partner will determine his/her success. Even within the top 10 importing countries a wide variation exists between markets' prospects: China's imports grew by 80% from 2000-2005, while The Netherlands' imports declined by 37%. In 2005 four countries (China, the US, Korea and Spain) comprised 87% of global imports. Given these countries' dominance of the market, they effectively are the market (refer to Figure 5.

Compared to the export market, the four largest importers are more geographically dispersed. On logical grounds this is to be expected as "creating artificial" climatic conditions to grow cassava is not economical and thus production is tied to areas that have suitable climatic conditions. The geographic dispersion of large import partners provides more nodes for potential exporters to enter the cassava market. As mentioned in the supply chain section, the manner in which cassava is processed affects its perishability and its weight, which has a host of transportation implications. This in turn affects exporters' logistical arrangements and also shapes their decision regarding which product to supply and which partner to select. For example, Costa Rica supplies fresh cassava to the US; however this strategy would probably not be an effective one for Thailand to adopt.

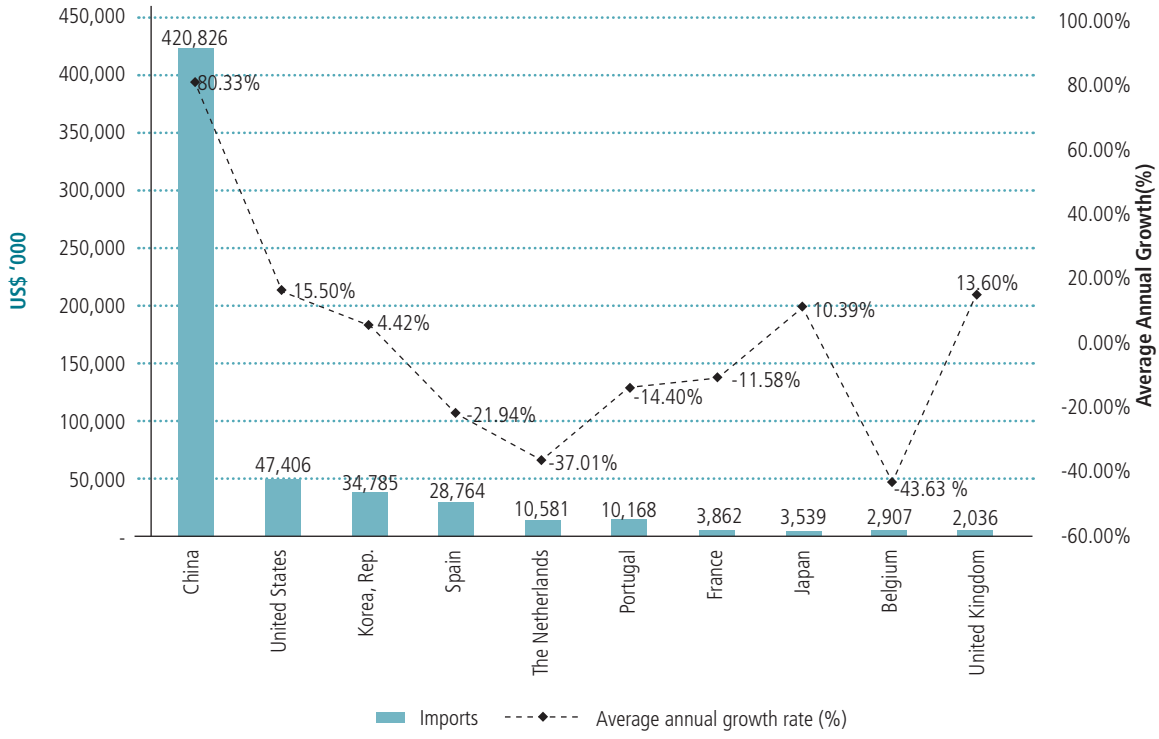
From 1995-2005 the top 7 importers' share of global imports changed substantially. China's share of the import market increased from 15% n 1995 to 67% 2005, while Spain, The Netherlands and Portugal's share of the import market fell 16%, 33% and 9%, respectively. The majority of the EU' s imports were absorbed by China, as a result the geographic location of cassava's demand base shifted to East Asia. The European Market predominately imported cassava pellets for animal feed, while the Asian countries basket of imported cassava products is more diverse, including pellets and industrial starches.

TABLE 8: REGIONAL IMPORTS OF CASSAVA (US$'000)

	Year			Average Annual Growth		Percentage of Total	
	1995	2000	2005	1995-2005	2000-2005	1995	2000
East Asia	97,809	52,251	460,070	16.75%	54.51%	21.09%	73.77%
EU25	408,328	305,709	59,534	-17.51%	-27.91%	88.05%	9.55%
NAFTA	15,807	23,738	48,725	11.92%	15.47%	3.41%	7.81%
Central America	34	297	913	38.92%	25.17%	0.01%	0.15%
South America	307	2,060	615	7.19%	-21.48%	0.07%	0.10%
South East Asia	289	368	445	4.39%	3.84%	0.06%	0.07%
Middle East	87	142	14	-16.87%	-37.31%	0.02%	0.00%
South Asia	-	7	9		6.03%	0.00%	0.00%
SADC	4	55	3	-2.54%	-43.84%	0.00%	0.00%
World	463,738	398,335	623,635	3.01%	9.38%	100.00%	100.00%

Source: Wits

FIGURE 5: TOP 10 IMPORTERS OF CASSAVA IN 2005 (US$'000)



Source: WITS

In 2005 China was the world's dominant importer of cassava, comprising 67% of global imports. More impressively, given China's large import volumes from 2000-2005, it managed to grow its imports by 80%, on an average annual basis. China's surging demand for cassava products fuelled the global import market's 9% growth rate. A few factors contributed to the growth in China's demand for cassava products. First, China reduced its import duty from 30% to between 7% and 11.2% in preparation for its accession to the WTO in December 2001 (ITC.2003:11). Second, China's rapid industrialisation created demand for industrial feed-stocks to produce ethanol and starches. Third, rising per capita income, urbanisation and the growth of the middle class increased the population's consumption of meat.

China's imports its cassava from Thailand, Vietnam and Indonesia. Given the low value of cassava products, it is uneconomical to transport these products long distances and thus geography influences trade patterns. This is illustrated in China's decision to import cassava products from South East Asia instead of South America.

From 1997-2000 both Thailand and Indonesia were vying to become China's dominant supplier, Thailand won the battle. Thailand was aggressively looking for new markets to reduce its dependency on the EU. In 2000 the government launched a purchasing programme to support producer prices resulting in the Thai Public Warehouse Organisation holding stockpiles of cassava. As a result Thailand had the capacity to meet China's unexpected surge in demand. Vietnam's cassava industry also grew on the back of China's increased demand, Indonesia's industry failed to capture benefits from China's growth phase. This scenario illustrates that market timing is a crucial factor determining an exporter's potential success. SADC's entrepreneurs, producers, and policy-makers could apply this lesson to entering into the ethanol market, which has the potential to be extremely lucrative.

China's imports comprise primarily of dried chips and pellets, used for animal feed, however its trade is weighted in favour of pellets (ITC; 2003). China imports about 60% of its chips to produce alcohol from Thailand and 11% from Vietnam (TTTA, 2004). China imports 40-50% of its starch to produce sweeteners and MSG from Thailand and 20-30% from Vietnam (TTTA, 2004).

Trade data shows that China's demand for cassava has grown exponentially. However this is past behaviour: Is China's growth sustainable

TABLE 9: TOP IMPORTERS OF CASSAVA (US$'000)

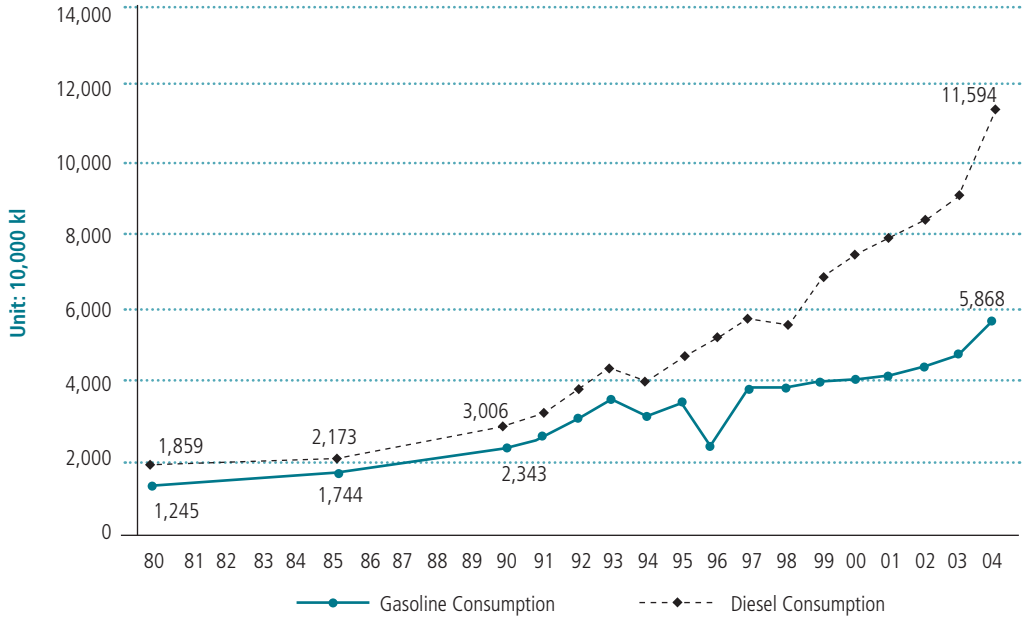
	Trade (US$'000)			Average Annual Growth				
	Years				Percentage of Total		Uses ('000Tons)	
	1995	2000	2005	2000-2005	1995	2005	2000	2004
China	67,680	22,065	420,826	80.33%	14.59%	67.48%	Feed:42%	Feed:62%
United States	15,062	23,064	47,406	15.50%	3.25%	7.60%	Feed:59%	Feed:61%
Korea, Rep.	27,261	28,015	34,785	4.42%	5.88%	5.58%	Food:98%	Feed:93%
Spain	96,277	99,275	28,764	-21.94%	20.76%	4.61%	Feed:100%	Feed:99%
The Netherlands	160,257	106,692	10,581	-37.01%	34.56%	1.70%	Feed:100%	Feed:100%
Portugal	49,321	22,130	10,168	-14.40%	10.64%	1.63%	Feed:100%	Feed:99%
France	11,029	7,146	3,862	-11.58%	2.38%	0.62%	Feed:91%	Starch:60%
Japan	2,855	2,159	3,539	10.39%	0.62%	0.57%	Food :100%	Food :100%
Belgium	-	51,076	2,907	-43.63%	0.00%	0.47%	Feed:100%	Feed:100%
United Kingdom	944	1,076	2,036	13.60%	0.20%	0.33%	Starch:50%	Starch:58%
Canada	744	671	1,319	14.48%	0.16%	0.21%	Starch:80%	Starch:68%
Taiwan, China	-	12	920	138.81%	0.00%	0.15%		
Italy	12,370	4,000	917	-25.51%	2.67%	0.15%	Feed:98%	Feed:96%
Australia	329	445	732	10.45%	0.07%	0.12%	Starch:90%	Starch:88%
Honduras	-	83	654	50.98%	0.00%	0.10%	Food:94%	Food:75%
New Zealand	43	296	528	12.29%	0.01%	0.08%	Food:97%	Starch:60%
Switzerland	248	260	487	13.35%	0.05%	0.08%	Starch:85%	Feed:81%
Colombia	288	1,519	384	-24.03%	0.06%	0.06%	Food:79%	Food:79%
Singapore	195	291	309	1.19%	0.04%	0.05%		
Iceland	1	2	220	156.38%	0.00%	0.04%	Starch:95%	Feed:92%
Total Top 20 Imports	444,905	370,277	571,343	9.06%	95.94%	91.61%		
Other Importers	18,833	28,058	52,292	13.26%	4.06%	8.39%		
World Imports	463,738	398,335	623,635	9.38%	100.00%	100.00%		

Source: Wits and FAOSTAT

over the long-term? Based on industry reports, the author asserts that China's growth in demand is sustainable, provided demand is driven by a new sub-segment, which in this case is the demand for bio-fuels. China's demand for fuel is increasing at an increasing rate (refer toError! Reference source not found.Fuel is required to power its industrialisation drive and rising per capita income has stimulated consumers' demand to own a car. Over the past two decades, China was the fastest growing automobile market in the world. From 1986-2004 growth in car ownership was11.8% and by 2004 the number of cars reached 26.94 million (refer to Figure 7) (Latner & O'Kray & Jiang, 2006:3). This growth should continue, and even increase, as China continues to industrialise. Over the medium term the demand for bio-fuels should grow as the economy's demand for fuel increases based on the government's policy that 15% of China's transportation energy needs must be supplied by bio-fuels by 2020 (Latner & O'Kray & Jiang, 2006:3). The Chinese government tabled legislation requiring consumers to use gasohol, which is 10-20% ethanol mixed with gasoline, as automotive fuel by 2008 (Howeler, 2003:21). This piece of regulation should increase the demand for cassava chips (Howeler, 2003:21).

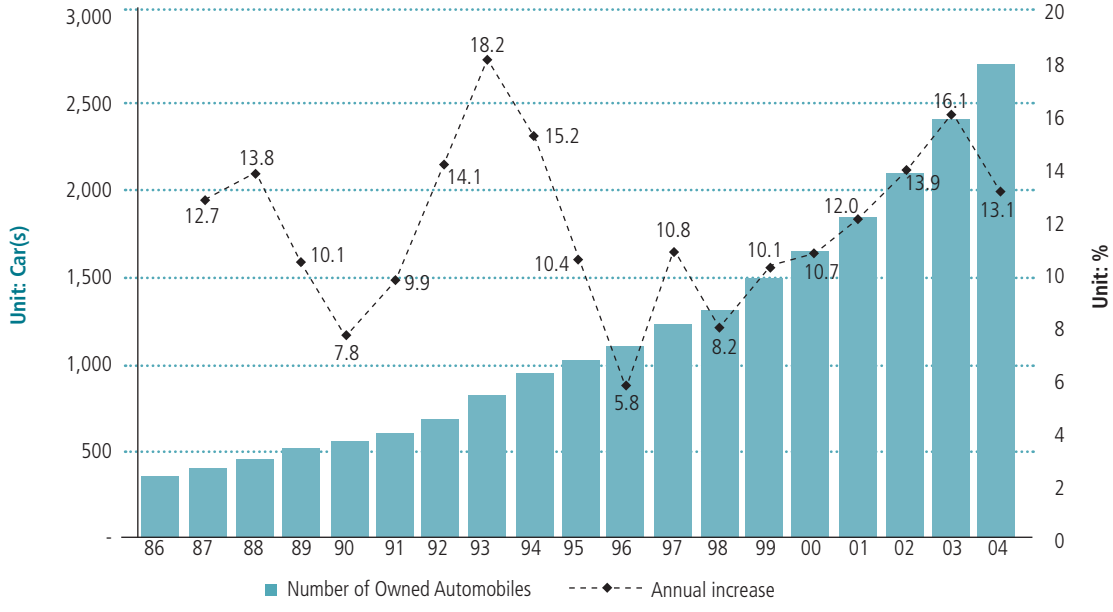
The Ethanol industry's future growth is dependant on government support in the form of subsidies or obligatory usage rates as a result potential investor's or suppliers to this industry are exposed to political risk. The only issue that could impact one's exposure to political risk is the government's plan to change the manner in which it supports the ethanol industry. Subsidies will be phased out, but state municipalities will be mandated to use ethanol and municipalities will be given government grants to construct ethanol production facilities (Latner & O'Kray & Jiang, 2006). This change affects the manner in which the government allocates funds to finance ethanol plants, but it does affect the demand for ethanol. As a conse-

FIGURE 6: GASOLINE AND DIESEL CONSUMPTION IN CHINA FROM 1980-2004



Source: Latner & O'Kray & Jiang; 2006:7

FIGURE 7: NUMBER OF VEHICLES IN CHINA AND THEIR RATE OF GROWTH FROM 1986-2004



Source: Latner & O'Kray & Jiang; 2006:7

quence China's production of ethanol should continue to increase passed its 2004 level of 3.7 billion litres of ethanol, making it the third largest global producer (Brant &Fang &Lin, 2006:5).

China produces ethanol from corn and wheat; however its primary feedstock is corn, for example, in 2006 90% of China's ethanol was produced from corn. Corn has become a "precious" commodity as China's economic growth increases the demand for grain and simultaneously reduces supply. Industrialisation increases urbanisation which changes a population's food consumption patterns toward convenience food and increased consumption of meat products. This led to the expansion of the livestock industry which uses corm as feed. In China corn is used as animal feed. However due to China's industrialisation and urbanisation both land and labour allocated to agricultural activities is falling. Thus a situation has de-

veloped where China's consumption of corn is increasing at a faster rate than its can increase it productive capacity, as a result from 2004 China become a net importer of grain (Brant et al, 2006). The Chinese government is concerned that being a net importer of grain could jeopardise China's long term goal of food security and food self-sufficiency, placing it in a precarious situation where it is reliant on foreign resources to achieve food security (Brant et al, 2006). The government' realises that its ethanol policy will increase the demand for ethanol to comprise a greater proportion of China's energy mix, which is growing at an increasing rate. As a result the consumption of ethanol is given a double boost which will have repercussions on the consumption of gain. If China does not diversify its feedstock it is predicted that by 2010 corn consumption could increase by 25% which would require China to import 10 million tons of corn a year to meet demand (Latner & O'Kray & Jiang, 2006:17). Also higher corn prices will reduce the competitiveness of China's growing food industry. These considerations caused the government to revisit the manner in which its bio-fuels industry will be developed in the future.

According to Yang Jian, the director of the development planning department under the Agriculture Ministry, the Government's policy regarding bio-fuels is that it "should neither impact the people's grain consumption, nor should it compete with grain crops for cultivated land (Pattern, 2006). A short-term solution to the pending problem led to China's ministry of administration publishing a warning in December 2006 that only four companies had permission to produce corn-based fuel (Pattern, 2006). This short-term solution is not viable over the long-term because China requires fuel to support its industrialisation drive. Ethanol production in 2005 was approximately 920,000 metric tons (MT), with a production capacity of 1,020,000 metric tons. The government predicts that China's ethanol production capabilities should increase to 4 million MT p.a by 2010 and to 15 million MT (Pattern,2006 and Latner & O'Kray & Jiang,2006:3).

If China is to meet the demand for ethanol without relegating its food security needs to second position, an alternative feedstock must be sought. This sentiment is echoed by Chinese officials, "the development of biofuel shouldn't be at the expense of the expansion of farmland, since food is still the priority of China. We should put more attention on sweet potato and cassava that are rich in starch and suitable for planting in China based on its terrain" (Pattern,2006). Sugarcane was considered but then ruled out: China's agricultural conditions are not suitable to grow this crop, industrial demand for sugar is increasing due to China's expanding food-processing industry and the sugar price is volatile (Brant et al 2006). After considering various options, cassava was selected as the new feedstock for China's ethanol industry. First, cassava is a cheaper option than grain, producing ethanol from cassava costs approximately $500/MT (4,000 Yuan/MT compared to 563/MT (4,500 Yuan/MT) for stale grain, as a result cassava is a cheaper option (Latner & O'Kray & Jiang, 2006:9). Second, the waste pulp from the production of cassava starch is used to make ethanol. It is more cost effective to use a by-product than to discard it (Howeler, 2003:21). Third, cassava is a versatile crop, it can be processed in form of fresh roots during the harvest season or dried chip and extracted starch when fresh roots are out of season. Lastly, stricter pollution regulations make the use of molasses uneconomical resulting in energy companies switching their feedstock from molasses to cassava (Howeler, 2003:21). The government's intent to use cassava as a feedstock to produce ethanol is demonstrated by the construction of a production facility capable of producing one million MT of fuel ethanol by 2010 in the Guangxi Zhuang Autonomous Region in southern China. This production facility is scheduled to begin operations in October 2007 at a production capacity of 110,000 MT per year (Latner & O'Kray & Jiang, 2006:20).

It is expected that over the medium term a greater proportion of cassava will be used to manufacture ethanol and the demand for ethanol will increase. China's economic growth is energy intensive and it is expected to increase and China's energy policy is being reformulated to use bio-fuels that are not produced from grains. Both these factors should increase the demand for cassava at a faster rate than China can domestically supply cassava, opening up a market for imports. Even if China grew cassava on 2.471 million acres its barren land, it production capabilities could increase from 13.3 million MT in 2006 to 34.3 million MT p.a, and employed the latest technology to increase its yields by 7 million MT pa, its production capacity would fall short of demand (Latner & O'Kray & Jiang, 2006:20). Despite these supply side measures China will need to import cassava. Not only does this provide an opportunity for SADC's farmers to export cassava, but it also could expose SADC's farmers to new forms of business arrangements that simplify their operations throughout the value-chain. For example, Henan's Tian Guan Group entered into a contract with the government of Laos to lease 15 square km of land to produce cassava (Latner & O'Kray & Jiang, 2006:20).

In 2005 the US was the second largest importer of cassava with an 8% share of the market, which is minuscule compared to China. However an 8% market share is impressive considering that in 1995 the US' share of the market was only 3%. This market has also experienced steady, strong growth. The growth rate of imports between 1995-2005 of 12% and 2000-2005 of 16% was within a tight range; however the market performed slightly better since 2002. It should be noted that on a volume

TABLE 10: TOP IMPORTERS' LARGEST TRADING PARTNERS FOR 2005 (BASED ON A PERCENTAGE OF TOTAL IMPORTS)

	Exporters					
Importer	First		Second		Third	
China	Thailand	81.09%	Vietnam	11.97%	Indonesia	6.94%
United States	Costa Rica	87.82%	Ecuador	5.86%	Ghana	1.41%
Republic Korea	Vietnam	51.91%	Thailand	28.80%	Indonesia	16.76%
Spain	Thailand	87.71%	Costa Rica	5.03%	The Netherlands	4.66%
The Netherlands	Costa Rica	43.65%	Thailand	18.11%	France	14.08%
Portugal	Thailand	91.64%	France	5.30%	Spain	1.80%
France	Costa Rica	52.88%	Cameroon	18.21%	Belgium	6.61%
Japan	Thailand	96.91%	Brazil	0.00%	Indonesia	0.96%
Belgium	Costa Rica	59.61%	The Netherlands	34.66%	Ghana	2.13%
United Kingdom	Costa Rica	72.35%	Ecuador	12.93%	Ghana	3.45%

Source: Wits

basis, the US' primarily uses cassava in the form of feed, but with respect to value, the US' largest market is the one for human consumption. Given that trade is discussed on a value basis the US' imports are primarily from Costa Rica, which specialises in supplying cassava for human consumption. Demand for cassava is not broadly based throughout the population but is driven by the Hispanic and Asian population (ITC, 2003). Given cassava's characteristics this would not be a lucrative market for SADC's farmers. However SADC's farmers could use this market as a case study. It shows that specialising and exporting a "niche" product to a target market could be a more profitable strategy than competing against low cost producers to supply a commodity based product to the Asian market. The question SADC's farmers could ask is where does the next profitable geographically accessible market for a niche product exist.

In 2005 Korea was the third largest importer of cassava with a market share of 5%. The demand for cassava in Korea seems to have stagnated. Korea's share of the global import market has remained unchanged since 1995 compared to 2005, even though its economy has grown and thus the demand for a feedstock should have increased. This lacklustre performance is reflected in the rate of growth of imports of 5% from 2000-2005. Since 1996 Korea's imports of pellets has followed a downward trend. The expansion of Korea's livestock industry outpaced the production of livestock feeds; as a result the shortfall was imported. Korea's cassava imports are limited to the import of dried cassava in the form of chips and pellets. Chips are imported from Vietnam and pellets are imported from Thailand. These markets are not contested are but dominated by both parties.

Based on trade statistics the following countries are potential emerging importers and could serve as a potential market: Canada, Australia, New Zealand, Switzerland, Iceland, Brazil (on a volume basis the feed industry uses 49% of total cassava) and Malaysia (on a volume basis 52% of total cassava is used by industry to produce starches).

9.2. Countries' exports

The export market for cassava experienced steady growth of 9.38% from 2000-2005 (refer to Table 11). Most of this growth was driven by the Top 10 exporters (refer toFigure 8 Top 10 Exporters of Cassava in 2005 (US$'000) Figure 8). In 2005 Thailand, Vietnam, Coast Rica and Indonesia comprised 96% of global exports and thus these four countries effectively constitute the global export market. A notable feature is that the export market is dominated by Asian producers: In 2005 they comprised 85% of global exports and occupied three out positions in the top 4 list of exporters.

Over the past decade, from 1995 to 2005, the top 5 exporting countries' market share and their relative rankings changed. Thailand maintained its position as the world's dominant exporter but lost market share. From 1995 to 2000 Vietnam and Costa Rica substantially increased their share of the export market. It appears that these two countries absorbed Indonesia's share of the market, which significantly declined during 1995-2005. An interesting observation is that Vietnam and Costa Rica pursued a different export strategy. Costa Rica exports cassava for human consumption to developed countries. Products are tailored towards niche markets, such as health stores and speciality food stores that sell ethnic

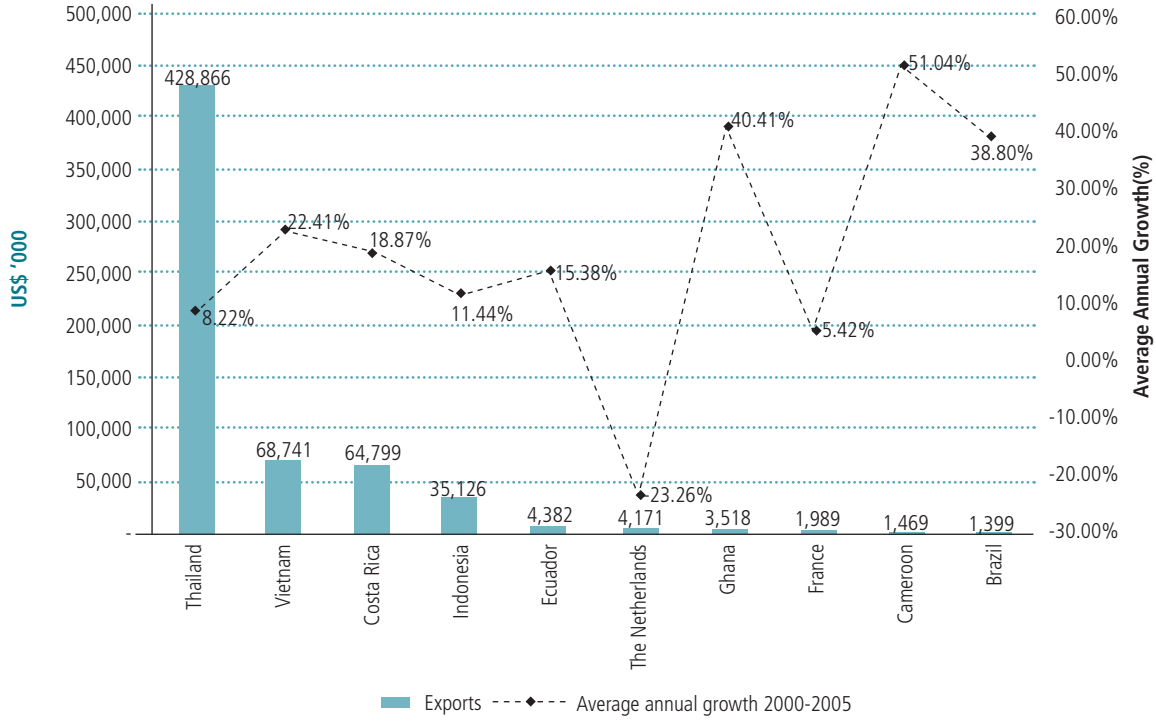
food. In contrast Vietnam exports cassava pellets to China to be used as animal feed for its livestock industry. These antidotes illustrate that to be a successful exporter, it is important to specialise in a product and map it to a country's demand profile instead of trying to export every product to every country. The above principle is an important point that SADC's farmers should note.

In 2005 Thailand was the world's dominant exporter of cassava, comprising 69% of the export market. It managed to grow its exports from 2000-2005 by 8%, which is impressive, even though it is substantially below Vietnam and Costa Rica's growth rate because Vietnam's export growth is off a large base. One of the reasons behind Thailand's success is its ability to deliver better quality products, on a more consistent basis, than other producers, especially its African counterparts, who are plagued by adverse weather conditions, various crop diseases and civil unrest. Thai farmers have ample support from the government throughout the supply chain, ranging from technical to financial assistance. The government's role in supporting its cassava industry ha contributed to Thailand being the preferred supplier to the top four global importing counties: China, Spain and Korea. Thailand's trade partners import cassava primarily for their livestock industry and also for industrial applications; as a result Thailand's largest export product is dry cassava products. Thailand was the world's third largest producer in 2004 and exports its own production, and thus does not rely on re-exports to service demand.

In 2005 Vietnam was the world's second largest exporter, but it trails behind Thailand, with 11% of the global export market. Vietnam's exports maybe smaller than Thailand's but Vietnam grew its export base at an exponential rate, from 2000-2005 its exports grow by 22%. Vietnam's trading partners are China, Korea and Australia. Similar to Thailand, Vietnam's dominant trading partner is China; this is largely due to the benefits of economic geography. It should be noted that Vietnam's strategy to place reliance on a single importer could be a risky long term strategy.

Costa Rica was the third largest exporter of cassava in 2005, with a market share of 10%. Costa Rica is an interesting case study because it is competing with the other top 4 exporters with respect to export volumes and growth rates but is follows a different export strategy with respect to the product it exports and markets it pursues. It exports frozen or waxed roots for human consumption to the US and the EU, mainly to the Netherlands and France.

FIGURE 8: TRADE IN CASSAVA 1995-2005 (US$'000)



Source: WITS

TABLE 11: TOP EXPORTERS OF CASSAVA (US$'000)

	Year			Average Average Growth 00-05	Percentage of Total	
	1995	2000	2005		1995	2005
Thailand	330,703	288,988	428,866	8.22%	71.31%	68.77%
Vietnam	14,155	25,008	68,741	22.41%	3.05%	11.02%
Costa Rica	18,200	27,301	64,799	18.87%	3.92%	10.39%
Indonesia	65,115	20,435	35,126	11.44%	14.04%	5.63%
Ecuador	54	2,143	4,382	15.38%	0.01%	0.70%
The Netherlands	1,028	15,674	4,171	-23.26%	0.22%	0.67%
Ghana	873	645	3,518	40.41%	0.19%	0.56%
France	158	1,527	1,989	5.42%	0.03%	0.32%
Cameroon	8	187	1,469	51.04%	0.00%	0.24%
Brazil	46	272	1,399	38.80%	0.01%	0.22%
Nicaragua	121	101	984	57.56%	0.03%	0.16%
Fiji	271	450	900	14.86%	0.06%	0.14%
Venezuela	266	-	816		0.06%	0.13%
Belgium	-	2,315	678	-21.78%	0.00%	0.11%
Philippines	1,205	453	674	8.29%	0.26%	0.11%
Suriname	142	3	565	186.50%	0.03%	0.09%
Malaysia	202	371	448	3.84%	0.04%	0.07%
Spain	13	452	373	-3.76%	0.00%	0.06%
Colombia	22	139	364	21.22%	0.00%	0.06%
Tonga	39	157	350	17.42%	0.01%	0.06%
Top 20 Exporters' Total	432,622	386,621	620,611	9.93%	93.29%	99.52%
Other Exporters	31,116	11,715	3,024	-23.73%	6.71%	0.48%
Total Exports	463,738	398,335	623,635	9.38%	100.00%	100.00%

Source: Wits

TABLE 12: TOP EXPORTERS' LARGEST TRADING PARTNERS FOR 2005 (BASED ON A PERCENTAGE OF TOTAL EMPORTS)

	Import Markets					
	First		Second		Third	
Thailand	China	79.57%	Spain	5.88%	Korea, Rep.	58.06%
Vietnam	China	73.28%	Korea, Rep.	26.27%	Australia	0.17%
Costa Rica	United States	64.25%	The Netherlands	7.13%	France	3.15%
Indonesia	China	83.13%	Korea, Rep.	19.97%	Romania	0.93%
Ecador	United States	63.35%	Colombia	8.75%	European Union	12.75%
The Netherands	Spain	32.14%	Belgium	24.16%	Italy	16.44%
Ghana	European Union	38.96%	The Netherlands	35.91%	United States	19.03%
France	The Netherlands	74.89%	Spain	9.82%	Portugal	3.68%
Cameroon	European Union	48.91%	France	47.86%	Switzerland	1.46%
Brazil	European Union	32.27%	The Netherlands	26.56%	France	10.76%

Source: Wits

TABLE 13: SADC'S USAGE OF CASSAVA IN 2004 ('000 TONS)

	Domestic Supply			Domestic Utilisation		
	Produce	Import	Export	Feed & Seed	Other	Food
Angola	6,650	1	0	1,300	1,792	3,559
Botswana	-	0	-	-	0	-
Congo, Dem Republic of	14,951	2	-	359	471	14,122
Madagascar	2,191	1	0	84	104	2,005
Malawi	2,559	1	-	385	1,080	1,095
Mauritius	0	2	0	-	2	0
Mozambique	6,413	0	0	369	1,287	4,758
Namibia	-	1	-	-	0	1
Seychelles	0	0	-	-	-	0
South Africa	-	76	0	-	75	0
Swaziland	-	0	0	-	0	-
Tanzania	6,890	4	2	58	1,711	5,122
Zambia	957	0	1	-	54	902
Zimbabwe	190	1	0	-	10	180
Total SADC	40,801	88	4	2,555	6,586	31,744
Total World	202,879	20,203	18,930	50,044	54,890	99,218
SADC's Share of Total	20.11%	0.44%	0.02%	5.11%	12.00%	31.99%

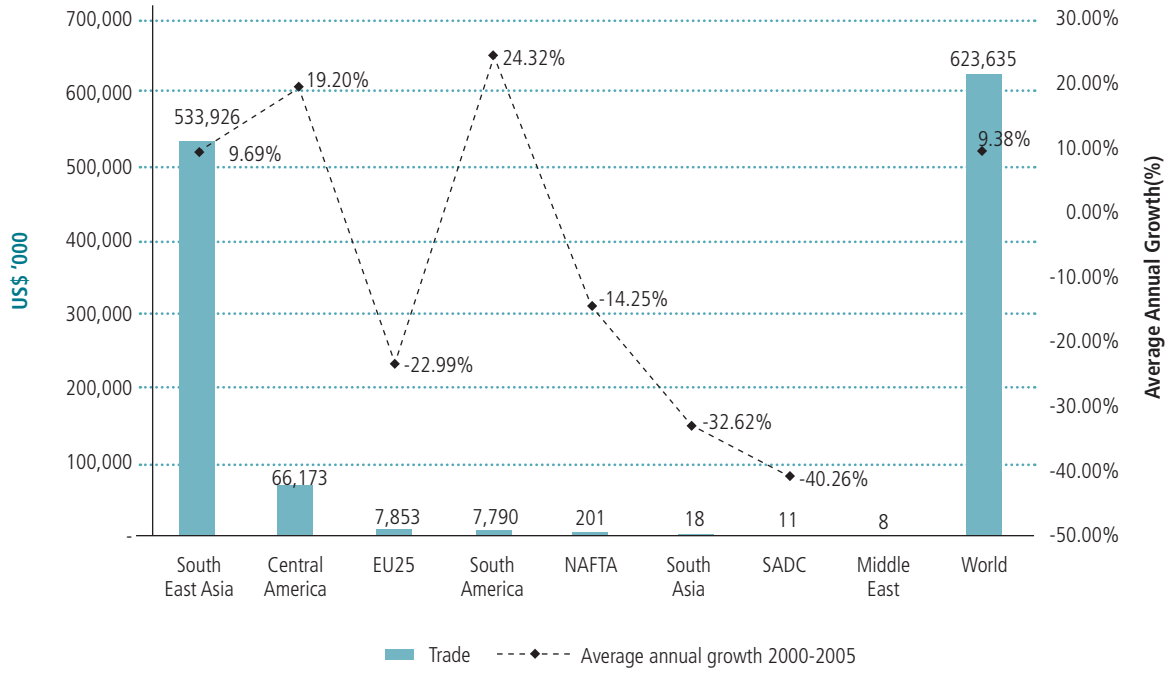
TABLE 14: SADC'S TRADE WITH THE WORL FROM 2000-2004 (US$)

	Imports (US$)				
	2000	2001	2002	2003	2004
Botswana		3,076	27,259	1,958	19,560
Lesotho	2,761	146	9,263	7	
Maurituis		5,748	7,538	9,127	10,865
Mozambique	161				
South Africa	371	188	162	380,716	1,451
Swaziland	370	186	17	256	3,875
Tanzania				1,131	
Zambia	584	57		1,164	1,347
Total SADC	4,247	9,401	44,239	394,359	37,098

	Exports (US$)				
	2000	2001	2002	2003	2004
Botswana			82,603		
Lesotho	16,374		30,155		
Maurituis		58	177		
South Africa	203	1,961	708	9,077	7,906
Swaziland	180	581		46	
Tanzania	17,052	147,328	1,516	7,796	1,048
Zambia		40	174		45
Total SADC	33,809	149,968	115,333	16,919	8,999

Source: SADC Trade Data Base, Trade and Industry Strategies

FIGURE 9: REGIONAL EXPORTS IN 2005 (US$'000)



Source: WITS

Based on trade statistics the following countries are potential emerging exporters and thus could be SADC's farmers' competition: Nicaragua, Colombia, Paraguay and Nigeria.

The largest exporters of cassava are not the largest producers. In 2005 only Thailand, Indonesia and Ghana managed to occupy a place in the top 10 producing countries and exporting countries. Considering African countries are large producers of cassava this indicates that Africa is not taking advantage of its productive capacity.

10. SADC trade

10.1. Trade with the world

Three out of the world's top ten producing countries are in the SADC region. These countries are the DRC, Tanzania and Angola, and they are ranked in fifth, seventh and eighth positions, respectively. SADC's imports are negligible, which is understandable, given its productive capacity with respect to climate, land and labour. An area for improvement is SADC's exporting capacity. SADC accounts for less than 1% of global exports, yet its production comprises 20% of global output. This indicates that cassava's potential as a cash crop is not being exploited due to supply and demand side bottlenecks. Given the crop's perishable nature, subsistence farmers on marginal land grow an adequate amount to consume as a staple food, and thus their yields are low. Marginal areas tend to be underdeveloped; as a result farmers' access to supply-side infrastructure and their resources to engage in marketing activities are limited. These supply-side rigidities make it difficult for farmers to export their crops. Therefore improving SADC's ability to export cassava will require sequenced, supply-side and demand-side initiatives.

SADC is a net exporter of Cassava to the world (refer to Table 14). Over the period under review, from 1995-2005, SADC's participation in global import and export markets was poor. A worrying sign is that the region's participation in global markets deteriorated from 2000-2005 when trade in cassava entered into its growth phase (refer to Figure 9). The world's trade in cassava grew by 9% from 2000-2005, while SADC's exports declined by 40% over the period. This suggests that SADC has been locked out of trade and was unable to tap into growing markets. SADC countries' import partners only include two of the top 10 importing countries. These countries are Portugal and France that are ranked in sixth and seventh position, respectively, whose combined share of global exports is 4%. Malawi exported cassava to Portugal. France imported cassava from Madagascar and the DRC.

10.2. Intra-SADC trade

Intra-trade between SADC states is negligible and appears to be random. This is in line with expectations as SADC countries grow cassava as a subsistence crop. Table 15 was included in the TIB for illustrative purposes, as it highlights that trade between member countries is sporadic.

11. Key countries' propensity to trade in cassava

The differential between production and consumption is due to the fact that cassava does not have a set harvest period (refer to Figure 10). A striking feature of this market is that only a small percentage of cassava produced is traded. Only one of the top 10 producing countries, Thailand, also appears on the list of top 10 exporters. This reflects the crop's status as a lowly subsistence crop grown on marginal land by small-scale farmers in lower-income developing countries. The low level of trade in cassava is not entirely a demand issue but also a supply issue. Raw cassava is not an export friendly product as it is bulky and perishable. The majority of cassava is produced in poor countries, whose infrastructure is poor and access to resources to create a market is limited. Also the majority of production is required to satisfy domestic consumption needs. Both these factors have made cassava a relatively obscure "tradable" product. Another issue that has also affected cassava's tradability is a lack of scientific research into the plant's properties and its industrial applications. This is not surprising as the dominant producers of cassava are poor countries that do not have the resources to conduct research.

The market for cassava is on the cusp of entering into a new phase. Over the long-term, a four tiered market for cassava products should develop. The first market will be for domestic consumption as a staple product and cassava will be grown and consumed in lower-income developing countries. International trade in this market will be thin, as the product is complicated to transport and has a low value.

The second market will be for animal feed that will be consumed in middle-income developing countries. Economic development and urbanisation has led to the growth of the middle class, whose diet comprises more livestock products than their rural counterparts. Changes in social-economic conditions have fuelled the livestock industry's expansion, which increases the demand for feed. Another factor that will affect this market's growth is the price of complementary and substitute products. Grain prices reached their highest level in seven years and this trend is expected to continue as the demand for gain increases due to the production of bio-fuels. Cassava feed is cheaper than its grain based substitute products and as it is a commodity product relative prices should impact consumers' behaviour. The popularity of cassava feed should increase and trade should grow at a steady rate. Cassava animal feed will be grown and processed in middle-income developing countries, such as Thailand, Vietnam and Indonesia, as exporting cassava requires infrastructure, marketing and distribution channels. Traditionally cassava feed is considered an entry level value-added product, and as such would provide SADC's farmers with an opportunity to produce value-added products. Also marketing cassava feed in SADC would not be difficult as the livestock industry is expanding and the price of grain base products is becoming prohibitively expensive for farmers to feed livestock. This product is simple to transport which is important as infrastructure in SADC is poor. As a result this product has potential for intra-regional trade.

The third market is the one for industrial applications, such as starches and the production of ethanol. These products will be produced in upper middle-income countries, and consumed in upper middle income countries and developed countries. Trade in this market is projected to grow at an increasing rate. The implication is that SADC's farmers should ultimately integrate their operations into supply chains to create industrial products.

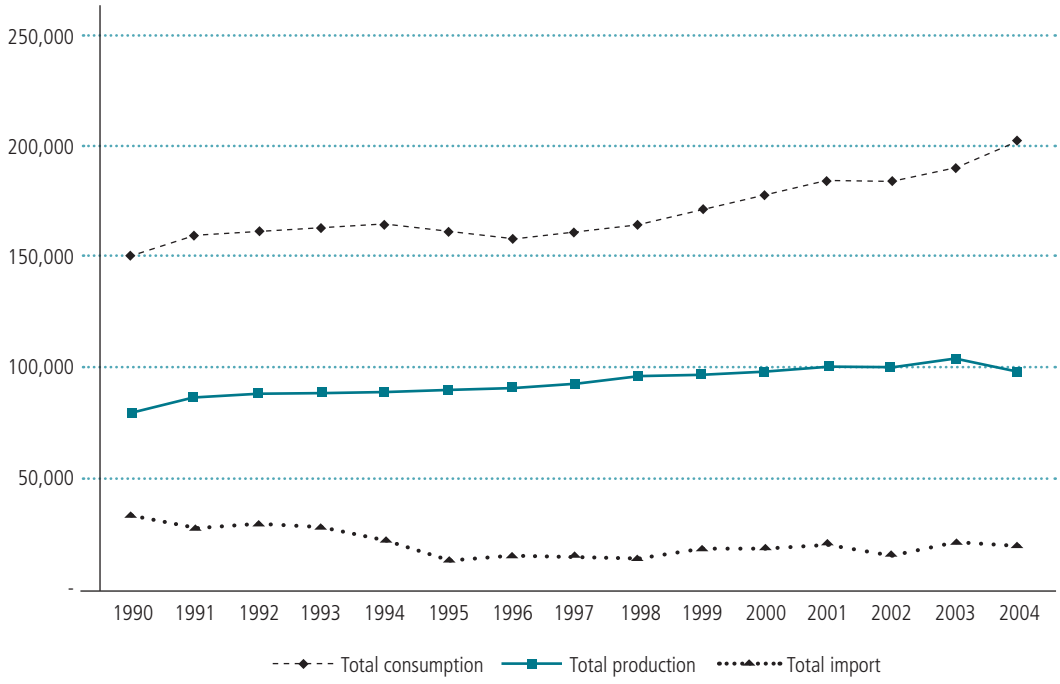
The fourth market is for premium quality cassava for human consumption in developed markets. This market's degree of tradability is dependant on

TABLE 15: INTRA SADC TRADE IN 2004 (US$)

		Importers				
		Angola	Botswana	Mozambique	South Africa	Zimbabwe
Exporters	Botswana				14	
	DRC					
	Namibia		179			
	South Africa	7,178	16,139	728		7,
	Zambia					45

Source: SADC Trade Data Base, Trade and Industry Strategies

FIGURE 10: MARKET TRENDS IN CASSAVA ('000 TONS)



Source: FAOSTAT

whether consumers' demand fresh or processed cassava, in the form of convenience foods. Trade in fresh cassava has a geographical dimension and requires complicated cold chain management. This is an area where SADC countries could share infrastructure across countries and products. For example South Africa has developed chain management to export cut flowers. This infrastructure could be used by cassava exports, especially considering that Rotterdam is a hub for fresh flower imports and a large re-exporter of cassava throughout Europe. Processing cassava into convenience foods simplifies or eliminates logical issues and the SADC producers could tap into South Africa's sophisticated processed food sector. As a result exporting processed food presents a viable opportunity for the region. This market is expected to experience strong growth; however it is off a low base.

The previous paragraph established that over the long term trade in cassava as a percentage of production should increase. To understand the market's unfolding dynamics it is useful to analyse the manner in which the industry's leaders source and consume cassava. The countries represented in Table 16 have been selected as they are dominant producers, suppliers, importers and exporters.

Based on industry trends over the medium term both Brazil and Indonesia will continue to grow cassava for their domestic use. China, Korea, the Netherlands, Spain and the US will import cassava to satisfy domestic demand. Experts predict that the nature of demand in the US, Korea, the Netherlands and Spain should remain relatively unchanged. Another factor that will drive China's demand for cassava is its bio-fuels industry; as a result "other uses" should substantially increase. Although China has its own plans to grow cassava on marginal land, and thereby supply their bio-fuels industry, this should not significantly affect its imports in the near term, as its increase in demand will be so great as to continue increasing at a much faster rate than its productive capacity well into the future. Indeed given China's incredible growth over the last 30 years and its massive population, which is rapidly becoming ever more affluent, the demand for bio-fuels, and other products made from cassava (e.g MSG) are likely to result in large importations for my years to come. Vietnam's domestic usage of cassava should also increase as a wealthier population consumes more livestock products. At this stage however, there is little evidence as to how much of the increase in demand Vietnam ad meet domestically. Should they be able to expand production significantly, they will not only meet their domestic demand, but will also, in most probability, capture a large amount of the Chinese market.

Costs Rica's strategy to export a specialised product to niche markets in developed countries does not seem likely to change. Nigeria's participation in export markets is likely to improve due to the government's successful

TABLE 16: KEY COUNTRIES USAGE OF CASSAVA ('000TONS)

	Supply ('000 Tons)			Utilisation ('000 Tons)		
	Produce	Imports	Export	Feed	Other	Food
Least Developed						
Bangladesh		371	0		252	119
Cambodia	362	3	24		140	202
Cameroon	2,093	0	3	138	509	1,443
Côte d'Ivoire	2,128	0	18	42	105	1,963
Ecuador	89	14	19		-6	89
Gabon	230	1	0		130	100
Ghana	9,739	2	78	1,057	3,308	5,298
Honduras	18	8	1		11	14
Kenya	643	12	5		149	501
Myanmar	139	8	-		34	113
Nicaragua	87	2	16	44	-13	42
Rwanda	766	1			-98	865
Middle-Income Developing						
Argentina	170	11	2	105	4	70
Brazil	23,927	180	1,389	11,714	4,048	6,955
China	4,216	11,305	426	9,077	4,088	1,931
Colombia	1,919	45	157	78	208	1,523
Costa Rica	295	3	174		-3	127
Czech Republic		18	0	17	0	
India	6,700	12	8		437	6,268
Korea, Republic of		1,044	43	994	8	
Malaysia	430	432	151	64	259	388
Paraguay	5,500	3	30	2,471	2,016	987
Peru	971	36	2	2	269	735
Philippines	1,641	199	3	45	230	1,562
Thailand	20,209	4	15,604	2	2,164	2,443
Viet Nam	5,821	1	2,731	2,328	364	400
Developed Countries						
Argentina	170	11	2	105	4	70
Brazil	23,927	180	1,389	11,714	4,048	6,955
China	4,216	11,305	426	9,077	4,088	1,931
Colombia	1,919	45	157	78	208	1,523
Costa Rica	295	3	174		-3	127
Czech Republic		18	0	17	0	
India	6,700	12	8		437	6,268
Korea, Republic of		1,044	43	994	8	
Malaysia	430	432	151	64	259	388
Paraguay	5,500	3	30	2,471	2,016	987
Peru	971	36	2	2	269	735
Philippines	1,641	199	3	45	230	1,562
Thailand	20,209	4	15,604	2	2,164	2,443
Viet Nam	5,821	1	2,731	2,328	364	400

Source: FAOSTAT

initiatives to build the industry's supply and demand side. Furthermore the government has alluded to the fact that it is building its domestic industry to provide a base to create an export crop. Nigeria's economy does have the capability to build critical mass in a specific product as domestic consumption is spread between various cassava products. The interesting question is whether Nigeria's exporting ambitions will come to fission. Perhaps this provides an opportunity for SADC's farmers and its Nigerian counterparts to form an alliance. Although South Africa does not import vast quantities of cassava starch it has the potential to and as it has established food processing, paper and chemical industries that use a wide range of industrial starches it might consider sourcing cassava from Nigeria in the future. This need not necessarily run contrary to the idea of SADC countries exporting to the South African market, and Nigeria does not have to be a major competitor, or inhibit development of commercial growing of cassava in the SADC region. Rather if Nigeria, South Africa, or another SADC country were to develop an industry that processes cassava, and achieve some scale economies, this could be a positive development for the region, as they would then gain a geographic advantage over the South East Asian and Latin American countries. Cassava has the potential to be a truly African product.

The interesting issue is whether Thailand will have the capacity to meet its growing domestic demand, while simultaneously satisfying China's increasing demand for imports. On the supply side, Thailand has planted cassava crops on its marginal land. The only alternative to increase its production is to increase productivity. However 100% of its crop comprises new, improved, high-yielding cultivars. Thailand's production costs should increase over the medium term as it faces land constraints, a shortage of labour and fertilisers tend to be relatively expensive compared to its Asian counterparts (Howeler, 2003). As a result Thailand's productive capacity is approaching its limit. On the demand side, domestic demand for cassava should increase to produce ethanol. Although ethanol is made from sugarcane this could change. A study by Kasetsart University (Kuakoon Piyachomkwan et al., 2002) concluded that in Thailand using dry cassava chips is the cheapest and must convenient way to produce automotive fuel, on a large-scale (Howeler,2003:21). Already a facility to produce ethanol from cassava is being constructed in Khon Kaen.

In addition, since 1990 Thailand has become a net importer of soybeans and maize, which are used to feed livestock. The growth of China's livestock industry has increased the demand for soybeans, pushing-up its price. This could cause Thailand to increase its domestic consumption of cassava pellets, creating a gap for other exporters to cover Thailand's exports to other Asian countries. A distinction must be made between diverting existing export supply into the domestic economy and an increase in the Asian market's ability to consume cassava feedstock. The region's livestock industry has grown, which would imply greater demand for cassava pellets. However creating potential demand into actual demand is dependant on the price of substitutes and complementary products. "In spite of recent price increases of all three crops, the cassava-soybean or cassava chips-leaf meal-soybean mixes are now considerably cheaper than maize soybean mixes with the same crude protein contents" (Howeler,2003:25). Over the medium term Thailand's ability to satisfy the demand requirements of its trade partners might be constrained, which provides an opportunity for SADC's farmers to broaden their export markets, provided they are low cost producers.

12. Prices

12.1. Producer prices

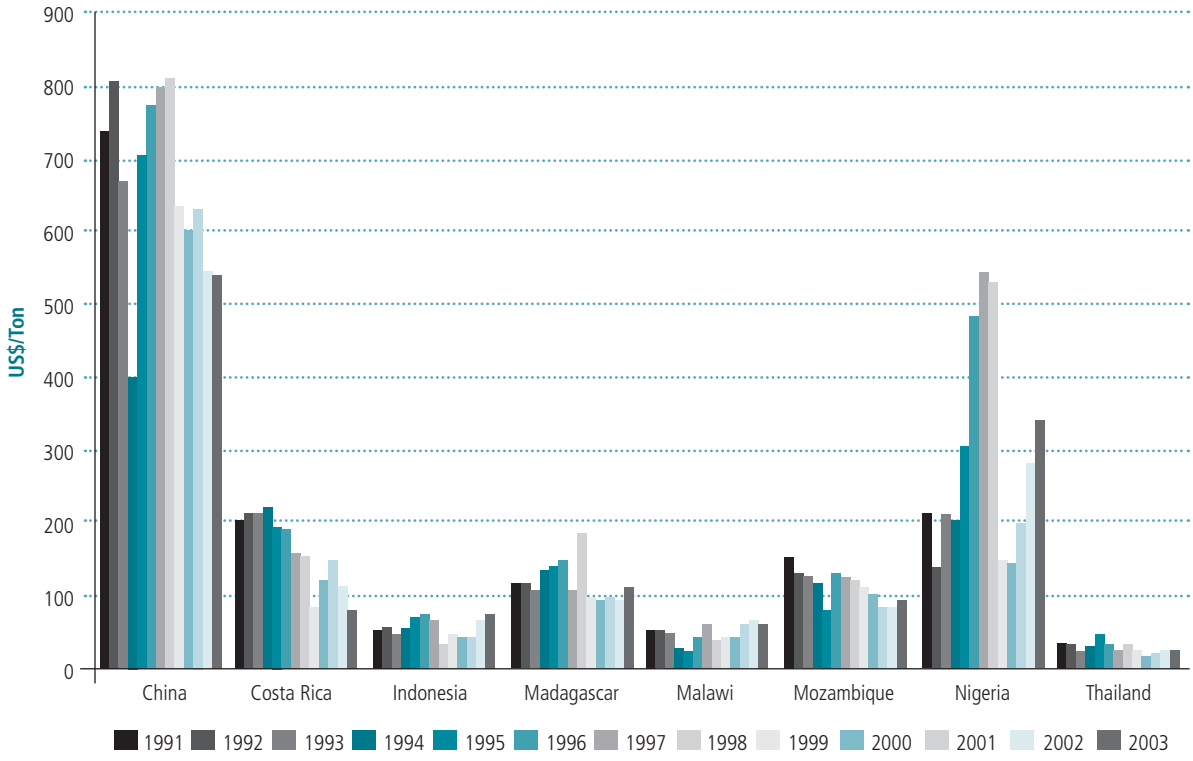
This section's discussion is based on price data obtained from FAO and covers cassava in its fresh and dried form. The FAO's price data is a good starting point to form a basic understanding of price trends and thus provides one with information to ask pertinent questions. One of the problems associated with using this data source is that the thinner a countries' trade, the more likely information will be inaccurate. The implication is that price data for SADC countries will be inaccurate.

Producer prices for countries represented in Figure 11 followed a progressive downward movement over the period, except for China and Nigeria that experienced price swings. Nigeria's price swings are due to the government's initiatives to invest in the industry and the policies it has implemented to increase demand. China's prices are volatile because of the interaction between constrained supply due to crop failures and increased demand. It is interesting to note that the dominant exporters of cassava share a similar producer price structure, and that their producer prices tend to be low. An encouraging sign is that Malawi's producer price is in line with the world's largest exporter, Thailand, and the world's fourth largest exporter, Indonesia.

12.2. Average import prices

The average import prices of countries illustrated in Figure 12, excluding South Africa and US, seem to follow a general trend: From 1994-1995 prices increased, then declined from 1995-1997, stabilised from 1997-2003 and from 2003 started to enter into an upward phase (refer to

FIGURE 11: COUNTRIES' PRODUCER PRICES (US$/TON)



Source: FAOSTAT

Figure 12). This brief trend line illustrates that prices tend to exhibit a cyclical pattern, which could be linked to the business cycle of an industry that uses a particular product application. The implication is that farmers should be aware of the business cycle that affects their market, and they should supply more than one product to an industry to minimise their exposure to business risk.

The US' average import price per ton is significantly higher than The Netherlands, China and Korea. This price differential reflects a product difference. The majority of the US' imports are superior quality cassava for human consumption (ITC, 2003:13).

12.3. Average export prices

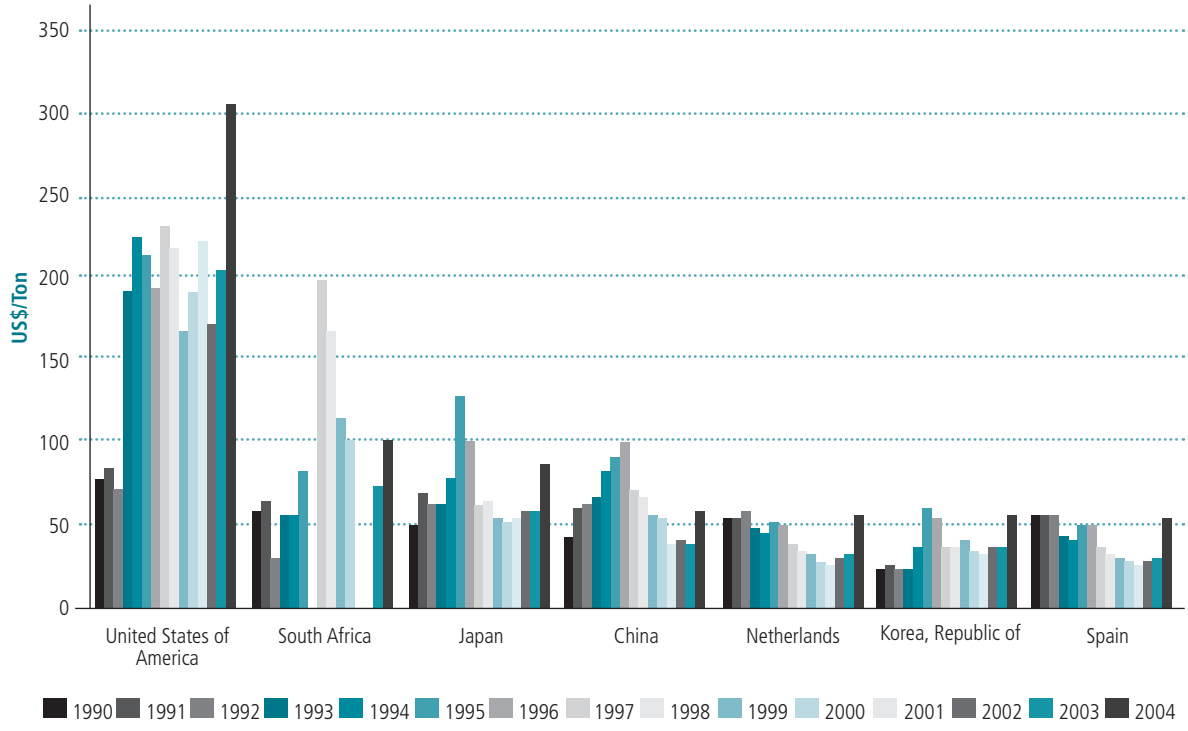
Countries' average export prices from 1993-2005 seem to be random but when the data is analysed there appears to be a tenuous link between export prices, product markets and geographic markets (refer to Figure 13 Countries' Average Export Price (US$/Ton). The Netherlands and Costa Rica's average export prices are volatile, but not random as they move through high peaks and low troughs. Costa Rica exports cassava for human consumption, which is a more specialised product than animal feed. It is no coincidence that the Netherlands' average export price is similar to Costa Rica's as it re-exports Costa Rica's product throughout Europe.

Thailand and Vietnam's prices tend to move in tandem and thus exhibit the same trend, although off a different base. Both these countries export a "commodity" based industrial product to China. This raises the question whether China's position as the world's dominant import market gives it the ability to negotiate prices with its suppliers. If this is the case then SADC farmers' ability to supply this market will be cost, and not necessarily, quality driven. As a result if SADC's farmers wish to enter the Chinese market, they must be able to compete against Thailand and Vietnam's low average export price.

12.4. Pellet and starch prices

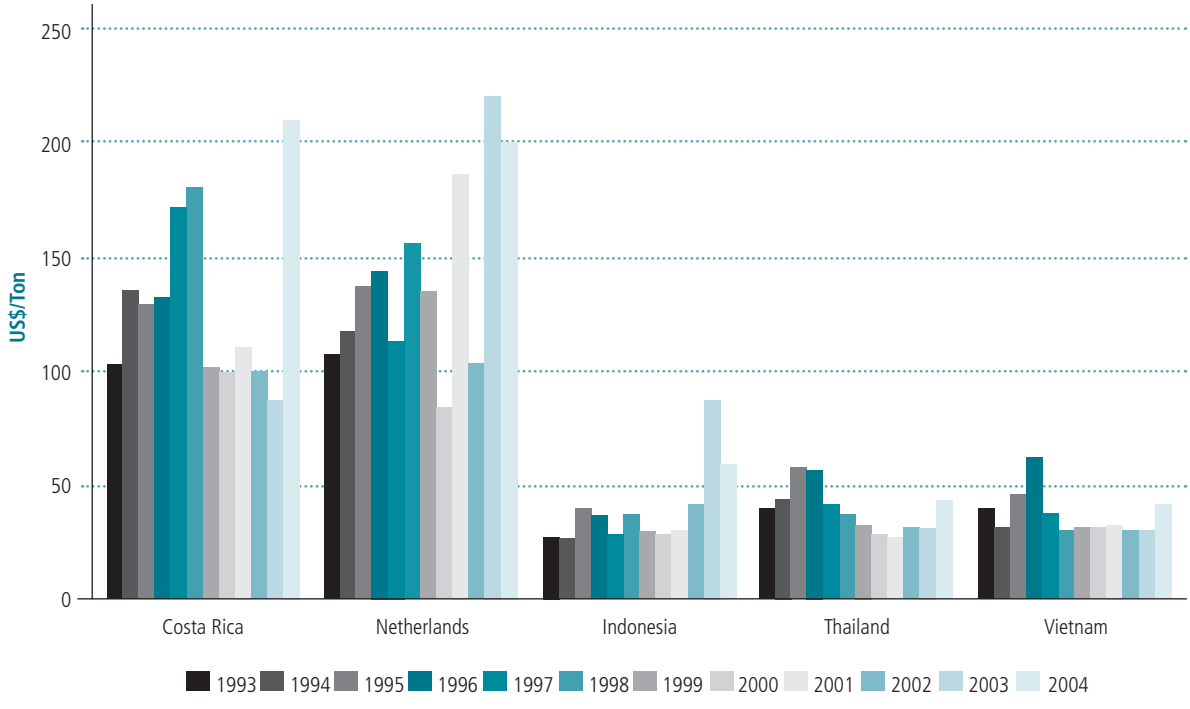
The FOB price for pellets and starch follow a similar trend over the period; although off different bases (refer to Figure 14). The average annual price for starch is higher than the price for pellets. This differential reflects that starch is a higher value product than pellets and as such involves a

FIGURE 12: COUNTRIES' AVERAGE IMPORT PRICE (US$/TON)



Source: FAOSTAT

FIGURE 13: COUNTRIES'AVERAGE EXPORT PRICE (US$/TON)



Source: FAOSTAT

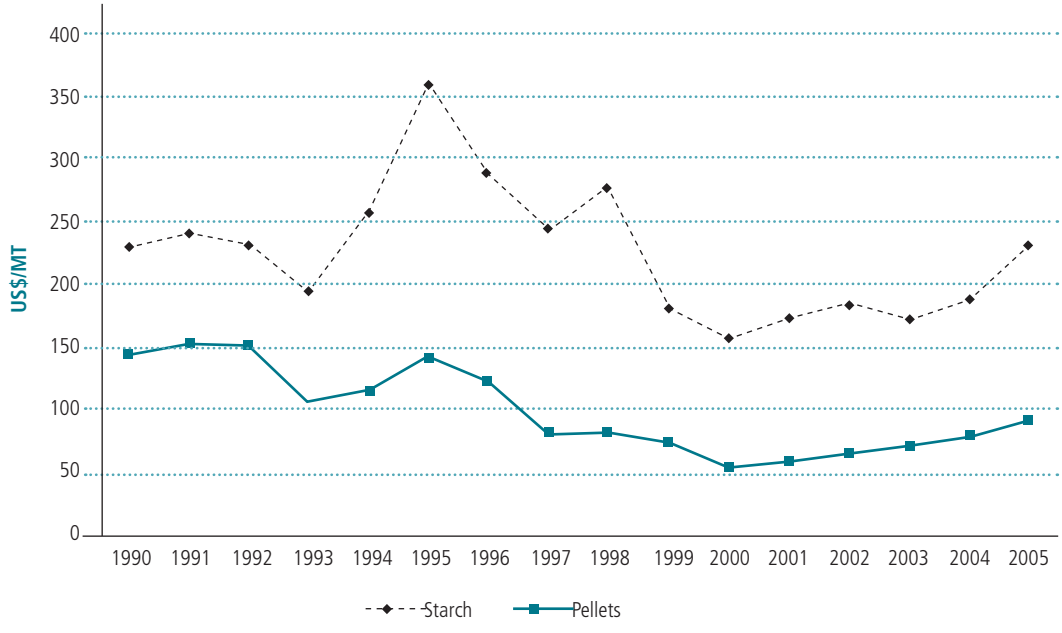
more complicated process. The export price of pellets fell from 1996-2000 due to competition from substitute products but this trend was broken in 2001 due to the Thai government's intervention and greater demand in East Asia. Demand was largely driven by China's consumption, which was due to cheaper cassava pellet prices and its poor sweet potato crop. China's buoyant economy increased the demand for pellets, lifting depressed prices. The recovery of pellet prices during 2004-2005 was due to a combination of factors; China's economic growth, product scarcity caused by drought and the impact of the Thai government's ethanol programme. Thailand's investment in the cassava feed industry gives the government an incentive to use its resources to safeguard its investment by manipulating prices. This could have a potentially negative effect for SADC's farmers, as they are exposed to additional market risk.

13. Market access

Countries use tariffs barriers and non-tariffs barriers to protect domestic farmers from imported goods. Tariffs increase the price of imported goods compared to domestic goods, thereby giving domestic producers a relative price advantage. Non-tariff barriers usually take the form of strict sanitary and phytosanitary measures or adherence to certification measures, such as 1SO 9000 standards. Non-tariff barriers increase a producer's costs throughout the supply chain due to the complexity of the processes that he/she must adhere too and the bureaucratic cost of ensuring that procedures are documented. As a result non-tariff barriers' potential to hinder exporters' ability to sell their products into foreign markets is greater than tariff barriers. Unlike tariffs, non-tariff barriers do not affect all producers equally. It is more onerous for farmers in developing countries to satisfy non-tariff barriers as their access to supply-side inputs is limited compared to their developing country counterparts. However collective organisation and the pooling of resources among SADC's farmers could be an effective strategy to reduce this burden.

On average, countries place higher tariff rates on a good as its move up the value chain. As a result the tariff rate applied to cassava starch products will be greater than the one applied to raw cassava. Also a bigger discrepancy exists between counties' tariffs for value–added goods compared to commodities. For example, "tariffs on cassava starch in the main importer countries range from zero in Canada, Indonesia, Malaysia and the United States to 480% in the Republic of Korea (IFAD, 2000: 25). When a farmer plans to export a value-added good, he/she should pay special attention to investigate tariff rates and quotas, and also any discrepancies that might exist between countries' rates.

FIGURE 14: STARCH AND PELLET FOB PRICES (US$/MT)



Source: The Tapioca Trade Association

TABLE 17: EUROPEAN UNION'S TRARIFF SCHEDULE

	07.14-1010 Pellets of flour and meal	07.14-1091 Cassava for human consumption	07.14-1099 Pellets made of cassava chips
Conventional rate of duty	9.50EUR/100kg		
Preference for WTO members (excl. TH*, ID*, CN*)		6% for imports below a quota of 145,590 tons	
Preference for countries, which are not members of the WTO		6% for imports below a quota of 2,000 tons	6% for imports below a quota of 30,000 tons
Preference for ACP countries	8.60EUR/100kg	0%	8.80 EUR/100kg
Preference for OCT	0%	0%	0%
Preference for least developed countries under GSP (excl. MM*)	0%	0%	0%
Preference for AL*, BA*, YU*, AD*, HR*, MK*, LB*, SM*	0%	0%	0%
Preference for China		6% for imports below a quota of 350,000 tons	
Preference for Indonesia		6% below a quota of 825, 000 tons	
Preference for Thailand	6% for imports below a quota of 5.5 million tons within a maximum quantity of 21 million tons over each four-year period.		

* AD - Andorra, AL - Albaria, BA - Bosnie - Herzegovina, CH - China, ID - Indonesia, HR - Croatia, MK - Former U=Yugoslav Republic of Macedonia, MM - Myanmar, LB - Lebanon, SM - Sam Marino, TH- Thailand, YU- Yugoslavia (Serbia and Montenegro)

Source: TARIC cited in ITC, 2003:16

13.1. Tariffs

13.1.1.EU

A general import duty of 9.5EUR/100kg is levied on cassava products that fall into the following sub-categories: Pellets of flour and meal, cassava for human consumption and pellets made of chips (ITC,2003). This general tariff does not apply to countries that have negotiated a bilateral trade agreement or qualify for a special provision. As a uniform tariff rate is not applied to countries imports, exporters should refer to macmap@intracen.og and TARIC for more in-depth tariff information. The table below is provided to give farmers a broad sense of tariff rates applied to countries' imports. It is not an in-depth study of tariff rates applied to SADC's exports. SADC's farmers should investigate whether they qualify for preferential treatment as a least developed country. The fact that Thailand receives preferential treatment is a concern as it is the world's dominant and cheapest exporter of cassava chips. Indonesia also receives preferential treatment but its exports to the EU are of a smaller magnitude than Thailand's.

According to the ITC (2003) before a product can freely circulate within the EU, an import certificate must be obtained in accordance with Reg. (EC) No 1291/2000 (OJL152). An import license must be obtained before an importer can take advantage of quota arrangements (ITC; 2003). To gain an import licence, importers must satisfy the conditions stipulated in EC 2449/1996 (0JL333). For more information refer to http://europa.eu.int/eur-lex.

13.1.2.US

The general tariff rate levied on countries' exports is not excessive. A host of countries have preferential access to the US market, but they are not major exporters of cassava. SADC countries receive preference under GSP, and thus their products enter into the US at a lower price than products from Asia's dominant exporters. Preferential access could give SADC's farmers a price advantage, provided their initial cost base is competitive with industry standards.

Costa Rica has preferential access to this market under the Caribbean Basin Economic Recovery Act. Given Costa Rica's preferential access and its proximity to the US market, it is doubtful whether SADC's farmers could compete against with respect to exporting fresh cassava for human consumption.

TABLE 18: US' TARIFF SCHEDULE

	07.14-1010 Frozen cassava	07.14-1020 Fresh, chilled or dried cassava
General tariff	7.9%	11.3%
Tariff for Cuba, Laos and North Korea	35%	50%
Preference under GSP (excl. Costa Rica)	0%	0%
Preference under Caribbean Basin Economic Recovery Act	0%	0%
Preference under Andean Trade Preference Act	0%	0%
Preference for Canada	0%	0%
Preference for Israel	0%	0%
Preference for Mexico	0%	0%
Preference for Jordan	1.9%	4.5%

Source: ITC, 2003;18

TABLE 19: CHINA'S TARIFF SCHEDULE

07.14-1010: Fresh Manioc	07.14-1020:Dried Manioc	07.14-1030 Chilled / Frozen Manioc
MFN:10%	MFN:7%	MFN:11.2%

Source: Mac Map cited in ITC, 2003:17

Cassava can only be imported into the US once an import permit is obtained. This permit certifies that the product satisfies phytosanitary regulations and the produce is pest and disease free. The first step of the process to obtain an import permit is to contact a national plant protection agency in the exporting country, for a list of foreign contacts refer to www.aphis.usda.gov/ppq/permits/phytosanitary/contact.pdf

13.1.3.China

China's tariff rates are in line with other large importers, notably the EU and the US. An important issue to consider is that Thailand's exports to China are subject to a zero tariff duty. This gives Thailand's exports a relative cost advantage in this market. Based on average import prices it is more apt to state that a zero tariff rate entrenches Thailand's status as a low cost supplier to China. The issue facing Thailand is not market access for it product but whether its rate of production is sufficient to satisfy both domestic and China's demand for cassava. This could imply that as the market for cassava becomes constrained, the advantage that preferential tariff access gives an importer becomes less important. For example China is entering into arrangements to secure agriculture products from countries that do not necessary have preferential access. The larger issue for China is access to land and labour to provide a consistent source of supply.

13.1.4.South Korea

The tariff rate applied to cassava products is in line with other major importing countries' rates, provided exporters do not exceed import quotas. Import quotas for chips are 150,000 tons and 296,000 tons for manioc pellets. In 2003 duties were 10% for chips and 2% for pellets (ITC, 2003:17). Once an importer exceeds the quotas, an excessive tariff is applied to his/her goods that could be in the region of 907.1% (ITC: 2003:17). A tariff rate of 47.8% is applied to frozen cassava (ITC, 2003:17).

13.2. Non-tariffs barriers

Cassava's products span a multitude of industries that are subject to different requirements. Regulation that covers food for human consumption is probably more comprehensive than standards applied to animal feed or feedstock for industrial applications, such as bio-fuels. This section does not attempt to provide an exhaustive list of non-tariff barriers for the various cassava products. Instead this section provides examples of general non-tariff barriers to illustrate their breadth. After this discussion exporters should realise that general research about this topic is insufficient, and that an exporter's research should be product / market specific.

Cassava should be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice - General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 3-1997) and other relevant Codex texts, such as Codes of Hygienic Practice and Codes of Practice.

Cassava should also comply with any microbiological criteria established in accordance with the Principles for the Establishment and Application of Microbiological Criteria for Foods (CAC/GL 21-1997).

Although it is not mandatory, it is generally accepted industry practice that suppliers have Hazard Analysis and Critical Control Point (HACCP) quality systems in place. If a supplier's systems are not certified it limits the marketability of his/ her goods, especially in developed countries.

Cassava's quality is based on its moisture, ash, crude fibre and starch content (ITC; 2003:28). Different countries have different quality standards. However a general "norm" does exist throughout the industry. Moisture content should range from "12% to 14 %, ash content and extraneous inorganic contaminants, such as sand and soil, should not exceed 3% and crude fibre content is generally accepted at 14% and starch content at 74 to 82%" (ITC; 2003:28).

Qualify standards tend to be market and product specific. The EU's quality standards for feed material are stipulated in Commission Directive 98/67/EC (OJ L 261). If the moisture content of cassava feed exceeds 14% of the weight of the feed material it must be declared (ITC, 2003). "For roots of cassava, regardless of their presentation the maximum content of ash insoluble in hydrochloric acid is 4.5% of dry matter" (ITC, 2003:18). According to directive 02/32/EC (OJ L 140) a cassava product's hydrocyanic acid content must be below 100 mg/kg, its "aflatoxin content must not exceed 0.05mg/kg if cassava is used as a complementary feeding stuff for cattle, sheep and goats and 0.03mg/kg for pigs and poultry. For dairy animals and young animals the maximum content is 0.005mg/kg" (ITC, 2003:18).

14. Marketing activities

Distribution channels tend to be product and market specific. As a result distribution channels will be different for animal feed, food ingredients, convenience foods and starch based products used to manufacture goods. Given the difference between distribution channels, on a product specific basis, and also the nuisances exiting within product specific distribution channels, this TIB does not cover this issue.

Although the manner a product is packaged is largely determined by the buyer, countries have minimum regulations. As a result an exporter should consult an industry association in his/her country to ensure that a product's packaging satisfies the importing countries' regulations.

15. Way forward

The way forward comprises five stages. First, identify markets that have grown over the past five years or are entering into their growth phase. This is not a simple task because a market's economic stage of development and its government's agricultural policies affects the type of cassava product it demands. For example the market for cassava feed in Africa is predicted to grow and be lucrative, whereas in Europe its growth is tapering-off. Given this TIB's scope, this section does discuss the prospect of exporting specific product to specific markets but rather highlights emerging trends. Second, investigate whether the quality and volume of cassava exists to satisfy a users' requirements. Third, consider the impact of substitute products on the demand, price and properties of cassava based products. Fourth, propose measures that could be used to improve cassava's competitiveness in its target market compared to its substitute products. Lastly, develop strategies to integrate small-scale farmers into established industry value chains, such as the processed food value-chain or the bio-fuel value chain.

Trade patterns are influenced by the interaction of regional, country and product dimensions. Experts predict that cassava feed is a potentially lucrative market in SADC. The region's demand for livestock products is increasing, which increases the consumption of feed. Importing maize and wheat to satisfy this demand is a relatively expensive option and it drains foreign reserves. This policy is not preferable considering that on average Africa uses 20% of its productive capacity to produce feed. Given the low value of cassava feed, transporting the product far distances is not profitable. These circumstances provide an opportunity for SADC's farmers to supply cassava feed to the region's livestock industry. However this does not imply that a market does not exist for native and modified starches to be used in SADC's food, textile, paper and pharmaceutical industries. Alternatively, in Asia, it is touted that the next growth market for cassava will be its usage in industrial applications as a modified starch and to produce bio-fuels, especially in Thailand and China. Although the above antidotes illustrate that differences exist between countries' demand drivers and usage trends, if data is analysed on a generalised level, it becomes apparent that the market for starches or starch based products offers the greatest potential for cassava, on a global basis.

Starches are a versatile product that can be used in an array of industries and applications, such as processed food, paper, textiles; ethanol and biodegradable plastics. Even within an industry, starch has a multitude of uses. According to the FAO, "the extent of specific functional properties of starches required by the food industry, alone, is almost unlimited, as no other ingredient provides texture to as many foods as starch does". In addition, given the rise of consumerism and urbanisation, consumers' demand for processed goods continues to grow. Another important factor is that starch is used to manufacture a range of products that cut across various industries that have different business cycles and demand drivers. Therefore farmers' exposure to volatile market movements, on average, should be reduced. Starch is the quintessential value-added cassava product. Generally, value-added products tend to be application specific and as a result are less prone to price swings than commodity products.

Competition between cassava and other starch sources is not between physical commodities; instead, it is based on the functional characteristics of these commodities' value-added products. As a result a starch should be viewed as "a set of functional characteristics suited to a particular application", and not a product per se (FAO,21). Native starches have biological properties that make them better suited to certain applications. Native cassava starch is also very resistant to acid conditions, it is intermediately resistant to freezing but very unstable during heating (sterilization), making it suitable for some and unsuitable for other applications (Dufour et al., 2000 cited in Howeler; 2003:29). Furthermore, cassava starch has a "neutral taste and odour, and the transparency, smoothness and viscosity of a gel, making it particularly suitable for many processed food items (Howeler; 2003:29).

The starch market is lucrative but entrance is based on a product's functionality and its cost. Cassava might be a cheaper product but does it have the desired properties to compete against other starches? To explore a crop's functional properties requires research and development activities. Cassava is viewed as a poor man's subsistence crop; as a consequence research about cassava's physical starch properties lags behinds its substitute starches. This places cassava at a relative disadvantage compared to other crops that have benefited from the development of superior cultivar strains and processing technologies that make it easier for them to fit into industrial activities. A comparative lack of interest in cassava has created an unstable crop characterised by sporadic cultivation, poor processing methods and lower quality products, which has marginalised cassava's usage in industrial applications. Thus substitute starches have an unfair advantage, and in essence one is not comparing like with like. Therefore for tropical starches to tap into the lucrative industrial starch market research is required to develop new products to satisfy users' specifications.

Initially this research should explore cassava's physical, chemical and organic properties to create a product that is easier to process and distribute. This implies that research to produce a superior starch begin with designing an improved cultivar type and end in the laboratory, where a starch is engineered. Based on this logic creating a better starch encompasses improving activities throughout the value chain, as a consequence the following activities are proposed as part of the way forward. First, create a more competitive crop. This involves modifying cassava's functional characteristics to develop a cultivar that produces roots which have a higher starch and nutritional content and thin, easy-to-peel skins (FAO, 21). Also research at this level should consider end users' requirements and then design a starch with the functional requirements to satisfy this need. This research is not overly complicated as slight changes in amylose/amylopectin ratios have a significant effect on functional characteristics (FAO, 21). Furthermore the costs incurred to produce tailor made starches could be recouped from end-users. Industry has an appetite to invest in developing a starch that is not grain or soybean based due to these commodities continued price hikes. This situation makes it easier for cassava starch to gain acceptance, provided it can compete against substitute starches in terms of its functional properties and consistent availability of quality supply at a relative price advantage.

Developing countries access to resources to conduct scientific research is limited. However this TIB argues that cassava starch can only compete against other starches if more value-added research is done on its functional properties. It seems that the starch market is potentially lucrative but is inaccessible; however this is not the case. Developing countries should devise strategies to spread R&D costs between institutions and consider forming partnerships with the private sector. This process could start with collaboration between various domestic institutions, regional institutions (forming relationships between SADC and other African trading blacks/ agencies) and tapping the resources of international institutions. These ventures should not solely focus on producing "outputs' (research) but rather foster cooperation throughout the value chain by encouraging "close and effective collaboration between national research and international extension institutions that work with local and provincial government officials" (Howeler, 2003:35). Encouraging participation at the local level is vitally important as it ensures that research is not an academic activity but improves the function throughout the supply chain. As a consequence the full benefits derived from this process will not be

realised unless "farmers become directly involved in testing, selecting and disseminating new practices and technologies (Howeler, 2003:35).

Asian counties have used the above approach to improve the profitability of their cassava industry. These countries' national research institutions collaborated with the Centro Internacional de Agricultura Tropical (CIAT) to develop a cassava cultivar that produces a 20%–40% higher yielding crop whose roots have a greater starch content (APBN,1998:385). Research had social and financial benefits as cassava is grown predominately by small-scale farmers. Thailand used farmer participatory research programmes to create opportunities for small-holder farmers in marginal areas on sloping and undulating land to participate in commercialised agriculture. These farmers' were involved in evaluating promising cassava germplasm, developing effective soil conservation practices and investigating balanced fertilization and cropping systems. This project was financed by the Nippon Foundation from 1994 to 2003. By the end of the project, new high yielding and high starch varieties were adopted in nearly 1 million ha (98% of cassava area) in Thailand, 100,000 ha (40%) in Vietnam and 36,000 ha (10%) in China, benefiting at least 800,000 cassava farmers (Howeler R & Kawano K & Watananonta W & Ngoan T).

The next area for research should be improving processing methods, especially post-harvesting techniques, to lower production costs. Given fresh cassava's bulky, perishable nature it is not economical viable to transport it long distances. This opens up opportunities for small scale farmers to get involved in rudimentary processing activities, provided they have access to machinery, finance and skills. Small scale farmers tend to dry cassava in the sun. This processing technique is not ideal as cassava can be contaminated, which makes it unfit for consumption. Small scale farmers cannot afford to purchase a flash-dryer, and addition, this technology is diesel/ fuel powered which pushes its operational cost above must farmers' means. Portable micro rotary dryers need to be developed to process cassava into a storable, high-quality product at the farm gate. It might be argued that incorporating small farmers into processing activities could reduce the competitiveness of a country's exports as scale economies are not fully exploited. This is not the case. Thailand has structured its cassava industry in such a manner that export led growth benefits parties throughout the value chain. Their model integrates small scale farmers into the value chain by creating farmer associations that pool supply side resources to invest in machinery and creates nodes for scale farmers to tap into the private sector's marketing resources and distribution networks.

The third stage of research should include developing new products and markets that exploit cassava's unique starch characteristics, with emphasis placed on the processed food industry, and applications to create bio-fuels. Developing new products tends to simulate demand for other products based on the initial product. There is a reinforcing relationship between market demand and product development: "'Market demand drives product development, and sometimes, new products create new market opportunities' (Howeler, 2003:34). This implies that "'for either to succeed, products and markets need to develop in coordination, and production, processing and marketing need to be fully integrated" (Howeler, 2003:34).

Although international starch markets have great potential, they also have drawbacks. They are complex and protected. Before starch producers venture into international markets, they build up critical mass by concentrating on supplying their domestic markets. In SADC's case, due to the market's size, this approach could be extended to creating a regional market. This may imply two policy outcomes: "Import substitution for competing products, especially if they are subsidised by the supplying countries, as is the case of potato starch from the EC, and further progress in reducing tariff and non-tariff barriers" (IFAD, 2000:7).

16. Conclusion

Cassava was selected as an export crop for SADC's farmers because of its hour-glass supply chain (ARC; 2007). Growing and harvesting cassava is a manual intensive activity and thus lends itself to small-scale production units. Post-harvesting activities involve milling and drying cassava and are not capital intensive or complicated and thus they can be conducted at the farm-gate or within the community or village. Other activities in the supply chain, such as refining, extracting, marketing, and packaging; tend to be more capital and knowledge intensive and thus benefit from scale economies. These activities are done by fewer larger-scale units, which then distribute their final product to a larger number of consumers. The shape of the supply chain provides possibilities for small-scale farmers located on marginal lands to become involved in producing a cash crop and to participate in rudimentary value-added processing activities. However for these benefits to be realised new micro drying technology must be developed and the supply chain must be analysed to provide small-scale farmers with nodes to tap into commercial agriculture's marketing and distribution networks.

Cassava can be processed into an array of products that can be used by numerous industries. The complexity of processes required to make these products vary. The simplest product is staple food and the most advanced

is a modified starch. A country's demand profile for a specific cassava product is linked to its stage of economic development. Therefore trade in cassava products tends to be country and product specific. Despite product specificity among countries, broad generalisations can be made. Over the long-term, cassava's best potential growth market is its application in starch and starch-based products. On a price basis cassava starch can compete against its substitute products, but cassava's ability to compete against them with respect to their functional properties is limited to specialised markets. Cassava's status as a poor man's crop has resulted in minimal scientific interest in the crop. This has created the perception that cassava lacks the "wide range of intrinsic starch characteristics found in the gene pool of some competing crops like maize, wheat and potato" (Howeler,2003:1). As a result cassava starch's application is limited compared to its substitutes, but perhaps more importantly, it is locked out of specialised markets that are less volatile and more profitable than mass markets (Howeler, 2002:1). Research into cassava's properties and its value-added applications has been made a priority by the FAO.

The market for cassava feed is growing, but its growth rate has tapered off since the 1980s. This market's growth is driven by the expansion of the livestock industry in Africa, South America and Asia. Consumption of cassava feed is growing in countries that produce cassava, while consumption in non-producing countries, such as the EU, has stagnated due to competition from substitute products, as a result trade flows should remain unchanged. Another issue to consider is that growth does not imply profitability, the demand for cassava feed is growing but average export prices are too low to cover production costs, unless a farmer can match Thailand's average export price, which might not be feasible given Thai farmers direct and indirect government support throughout the vale chain.

The market for animal feed is unstable and thus relatively high risk compared to other markets because the price of cassava feed is affected the price of substitute and complementary products, which in turn is influenced by agricultural polices and climatic conditions. It might be argued that cassava starch faces the same problem, but this is incorrect as starches complete on a basket of factors, of which one factor is price. This TIB suggests that SADC's farmers should enter the feed market, as it represents the second stage in supplying a value-added product, but be selective about which market it supplies. Competing against Thailand, the world's low cost producer, will be difficult. The best strategy would be to supply a geographically close, uncontested growing market, such as Sub-Saharan Africa.

Data presented in this TIB illustrates that building on SADC's production capacity to turn cassava into a cash crop has economic and social benefits. For these potential benefits to become tangible requires sequenced programmes that builds on the industry's supply and demand side abilities, identifies bottlenecks and addresses constraints. On the supply side these measures should initially focus on improving yields and reducing processing costs, as these activities form the basis of developing value chains for lucrative products, such as cassava feed for Africa, starches for developed markets ethanol for Nigeria, Ghana, Thailand and China). Access to resources is a constraining factor in SADC. Establishing a new value chains is a resource intensive activity, therefore to stretch scarce resources further, the development of a processing network that shares similar standards is important. On the demand side restructuring measures could encompasses the following activities: stimulate the development of a domestic market that has the flexibility to "slot" into regional markets and use local markets to test the popularity of innovative cassava based products. For example, cassava can be used as a raw material to produce bio-fuels. To explore lucrative opportunities in this field, the value chain involved in producing cassava and bio-fuels should be mapped and areas of co-operation should be explored.